Exhibit 1028

ZTE Corporation and ZTE (USA) Inc.

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Robert K. Rogers, Jr.
Administrative Law Judge

In the Matter of	
CERTAIN WIRELESS DEVICES WITH 3G AND/OR 4 G CAPABILITIES AND COMPONENTS THEREOF	**Investigation No. 337-TA-868**

RESPONSE OF ZTE CORPORATION AND ZTE (USA) TO THE COMPLAINT OF INTERDIGITAL COMMUNICATIONS, LLC UNDER SECTION 337 OF THE TARIFF ACT OF 1930, AS AMENDED, AND NOTICE OF INVESTIGATION

Pursuant to 19 C.F.R. § 210.13(a), Respondents ZTE Corporation and ZTE (USA) (collectively "ZTE") hereby respond to the Complaint filed by Complainants InterDigital Communications LLC, InterDigital Technology Corporation, and IPR Licensing, Inc. ("Complainants" or "InterDigital") on January 2, 2013, in the above-captioned investigation ("this Investigation") and to the Notice of Investigation issued by the United States International Trade Commission ("Commission") dated January 31, 2013.

The following headings and numbered paragraphs correspond to and respond to the numbered paragraphs set forth in the Complaint for ease of reference. However, to the extent that such headings themselves contain factual and legal characterizations, ZTE denies such characterizations.

I. INTRODUCTION

1.1 ZTE admits that Complainant has filed the Complaint under Section 337 of the Tariff Act, as amended, 19 U.S.C. § 1337, but denies that Complainant is entitled to any relief. ZTE denies the remaining allegations of paragraph 1.1 of the Complaint.

1.2 ZTE admits the Complaint proposes the following respondents: Samsung Electronics America, Inc.; Samsung Telecommunications America, LLC; Huawei Device USA, Inc.; FutureWei Technologies, Inc. d/b/a Huawei Technologies (USA); Nokia Corporation; Nokia Inc.; ZTE Corporation; and ZTE (USA) Inc.

1.3 ZTE admits that purported copies of U.S. Patent No. 7,190,966 ("the '966 patent"); U.S. Patent No. 7,286,847 ("the '847 patent"); U.S. Patent No. 8,009,636 ("the '636 patent"); U.S. Patent No. 7,706,830 ("the '830 patent"); U.S. Patent No. 7,941,151 ("the '151 patent"); U.S. Patent No. 7,616,970 ("the '970 patent"); and U.S. Patent No. 7,502,406 ("the '406 patent") (collectively, "the Asserted Patents") are attached as Exhibits 1-7 respectively. ZTE lacks knowledge or information sufficient to form a belief about the truth of the remaining allegations in paragraph 1.3, and therefore denies the same.

1.4 ZTE admits that purported copies of the recorded assignments for the Asserted Patents are attached to the Complaint as Exhibits 8-14. ZTE lacks knowledge or information sufficient to form a belief about the truth of the remaining allegations in paragraph 1.4, and therefore denies the same.

1.5 ZTE is without sufficient knowledge or information in this investigation to admit or deny the allegations in paragraph1.5 and Complainant fails to demonstrate that an industry as required by 19 U.S.C. § 1337(a)(2) and (3) exists in the United States relating to InterDigital's exploitation of the Asserted Patents, therefore, the allegations in paragraph 1.5 are denied.

1.6 ZTE admits Complainant has requested relief, but denies that Complainant is entitled to any remedy, as it may relate to ZTE and its business. ZTE further denies that Complainant is entitled to any relief whatsoever as a result of this Investigation.

II. COMPLAINANTS

A. InterDigital Communications, LLC

2.1. ZTE is without sufficient knowledge or information to admit or deny the allegations in paragraph 2.1, and they are therefore denied.

B. InterDigital Holdings, Inc.

2.2. ZTE is without sufficient knowledge or information to admit or deny the allegations in paragraph 2.2, and they are therefore denied.

C. InterDigital Technology Corporation

2.3. ZTE is without sufficient knowledge or information to admit or deny the allegations in paragraph 2.3, and they are therefore denied.

D. IPR Licensing, Inc.

2.4. ZTE is without sufficient knowledge or information to admit or deny the allegations in paragraph 2.4, and they are therefore denied.

E. InterDigital's History

2.5. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 2.5, and they are therefore denied.

2.6. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 2.6, and they are therefore denied.

2.7. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 2.7, and they are therefore denied.

2.8. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 2.8, and they are therefore denied.

2.9. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 2.9, and they are therefore denied.

2.10 ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 2.10, and they are therefore denied.

III. PROPOSED RESPONDENTS

A. Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC

3.1. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.1, and they are therefore denied.

3.2. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.2, and they are therefore denied.

3.3. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.3, and they are therefore denied.

B. Nokia Corporation and Nokia Inc.

3.4. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.4, and they are therefore denied.

3.5 ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.5, and they are therefore denied.

C. ZTE Corporation and ZTE (USA) Inc.

3.6 ZTE admits that ZTE Corporation is a Chinese corporation located at ZTE Plaza, No. 55 Hi-Tech Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong Province 518057, China. ZTE admits that ZTE Corporation is involved in the design, development, manufacture, importation, and sale of wireless devices with 3G and/or 4Gcapabilities and components thereof.

3.7 ZTE admits that ZTE (USA) is a New Jersey corporation located at 2425 N. Central Expy., Ste. 323, Richardson, TX 75080. ZTE admits that ZTE (USA) Inc. is involved in

the importation, sale, and distribution of ZTE Corporation's wireless devices with 3G and/or 4G capabilities in the United States. ZTE admits that ZTE Corporation and ZTE (USA) Inc. are collectively referred to as "ZTE" in the Complaint.

D. Huawei Technologies Co., Ltd., Future Wei Technologies, Inc. d/b/a Huawei Technologies (USA) and Huawei Device USA, Inc.

3.8. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.8, and they are therefore denied.

3.9 ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.9, and they are therefore denied.

3.10 ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 3.10, and they are therefore denied.

IV. THE TECHNOLOGY AND THE PRODUCTS AT ISSUE

4.1. ZTE denies the statements and allegations of paragraph 4.1 and the accompanying footnote to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 4.1 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 4.1 and accompanying footnote, and they are therefore denied.

4.2. ZTE denies the statements and allegations of paragraph 4.2 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 4.2 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the

Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 4.2, and they are therefore denied.

4.3. ZTE denies the statements and allegations of paragraph 4.3 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 4.3 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 4.3, and they are therefore denied.

4.4. ZTE denies the statements and allegations of paragraph 4.4 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 4.4 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 4.4, and they are therefore denied.

4.5. ZTE denies the statements and allegations of paragraph 4.5 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 4.5 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the

preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 4.5, and they are therefore denied.

4.6. ZTE denies the statements and allegations of paragraph 4.6 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 4.6 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 4.6, and they are therefore denied.

4.7. ZTE denies the statements and allegations of paragraph 4.7 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 4.7 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 4.7, and they are therefore denied.

V. THE ASSERTED PATENTS AND NON-TECHNICAL DESCRIPTION OF THE INVENTIONS

5.1. ZTE admits that there are seven patents asserted in this Complaint: U.S. Patent No. 7,190,966; U.S. Patent No. 7,286,847; U.S. Patent No. 8,009,636; U.S. Patent No. 7,706,830; U.S. Patent No. 7,941,151; U.S. Patent No. 7,616,970; and U.S. Patent No. 7,502,406.

A. U.S. Patent No. 7,190,966

1. Identification of the Patent and Ownership by InterDigital

5.2. ZTE admits that the '966 patent is on its face entitled "Method and Apparatus for Performing an Access Procedure," and that it states on its face that it issued on March 13, 2007, to inventors Fatih Ozluturk and Gary R. Lomp. ZTE admits that the '966 patent on its face states that it is based on Patent Application No. 11/169,490, filed on June 29, 2005, and claims priority to, *inter alia,* Application No. 08/670,162, filed on June 27, 1996, now U.S. Patent No. 5,841,768.

5.3. ZTE admits that the '966 patent appears to have one independent claim and eleven dependent claims. ZTE admits that claims 1, 3, and 6-12 are being asserted in the Complaint against Samsung, Huawei, and ZTE and are not being asserted against Nokia. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the remaining allegations in paragraph 5.3, and they are therefore denied.

5.4 ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.4, and they are therefore denied.

5.5. ZTE admits that the Complaint purports to be accompanied by copies of the prosecution history of the '966 patent, and copies of all cited references.

2. Non-Technical Description of the Patent

5.6. ZTE denies the statements and allegations of paragraph 5.6 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.6 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the

preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.6, and they are therefore denied.

5.7. ZTE denies the statements and allegations of paragraph 5.7 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.7 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.7, and they are therefore denied.

5.8. ZTE denies the statements and allegations of paragraph 5.8 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.8 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.8, and they are therefore denied.

3. Foreign Counterparts to the Patent

5.9. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.9, and they are therefore denied.

B. U.S. Patent No. 7,286,847

1. Identification of the Patent and Ownership by InterDigital

5.10. ZTE admits that the '847 patent is on its face entitled "Method and Apparatus for Performing an Access Procedure," and that it states on its face that it issued on October 23, 2007, to inventors Fatih Ozluturk and Gary Lomp. ZTE admits that the '847 patent on its face states

that it is based on Patent Application No. 11/169,425, filed on June 29, 2005, and claims priority to, *inter alia,* the same application filed June 27, 1996, to which the '966 patent claims priority.

5.11. ZTE admits that the '847 patent appears to have eleven independent claims and no dependent claims. ZTE admits that claims 1-3 and 5-11 are being asserted in this Complaint against Samsung, Huawei, and ZTE and are not being asserted against Nokia. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the remaining allegations in paragraph 5.11, and they are therefore denied.

5.12. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.12, and they are therefore denied.

5.13. ZTE admits that the Complaint purports to be accompanied copies of the prosecution history of the '847 patent, and copies of all cited references.

2. Non-Technical Description of the Patent

5.14. ZTE denies the statements and allegations of paragraph 5.14 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.14 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.14, and they are therefore denied.

5.15. ZTE denies the statements and allegations of paragraph 5.15 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.15 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the

preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.15, and they are therefore denied.

5.16. ZTE denies the statements and allegations of paragraph 5.16 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.16 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.16, and they are therefore denied.

3. Foreign Counterparts to the Patent

5.17. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 5.17, and they are therefore denied.

C. U.S. Patent No. 7,616,970

1. Identification of the Patent and Ownership by InterDigital

5.18. ZTE admits that the '970 patent on its face is entitled "Dual Mode Unit for Short Range, High Rate and Long Range, Lower Rate Data Communications," and that it states on its face that it issued on November 10, 2009, to inventor Thomas E. Gorsuch. ZTE admits that the '970 patent states on its face that it is based on Patent Application No. 11/326,809, filed on January 6, 2006, and claims priority to, *inter alia,* Utility Application No. 09/400,136, filed on September 21, 1999, and now issued as U.S. Patent No. 6,526,034.

5.19. ZTE admits that the '970 patent appears to have two independent claims and sixteen dependent claims. ZTE admits that claims 1-18 are being asserted in this Complaint against Samsung and are not asserted against Nokia, Huawei, and ZTE. ZTE admits that Complainant asserted the '970 patent against ZTE in a previous investigation. ZTE lacks

sufficient knowledge or information in the present investigation to admit or deny the remaining allegations in paragraph 5.19, and they are therefore denied.

5.20. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.20, and they are therefore denied.

5.21. ZTE admits that the Complaint purports to be accompanied by copies of the prosecution history of the '970 patent, and copies of all cited references.

2. Non-Technical Description of the Patent

5.22. ZTE denies the statements and allegations of paragraph 5.22 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.22 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.22, and they are therefore denied.

3. Foreign Counterparts to the Patent

5.23. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.23, and they are therefore denied.

D. U.S. Patent No. 7,941,151

1. Identification of the Patent and Ownership by InterDigital

5.24. ZTE admits that the '151 patent on its face is entitled "Method and System for Providing Channel Assignment Information Used to Support Uplink and Downlink Channels," and that it states on its face that it issued on May 10, 2011, to inventors Marian Rudolf, Stephen G. Dick, and Phillip J. Pietraski. ZTE admits that the '151 patent states on its face that it claims priority to, *inter alia,* Provisional Application No. 60/523,049, filed November 18, 2003.

5.25. ZTE admits that the '151 patent appears to have four independent claims and fifty-four dependent claims. ZTE admits that claims 1-6, 8, 9, 16-21, 23, and 24 are being asserted in this Complaint against all proposed respondents.

5.26. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.26, and they are therefore denied.

5.27. ZTE admits that the Complaint purports to be accompanied by copies of the prosecution history of the '151 patent and copies of all cited references.

2. Non-Technical Description of the Patent

5.28. ZTE denies the statements and allegations of paragraph 5.28 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.28 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.28, and they are therefore denied.

3. Foreign Counterparts to the Patent

5.29. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 5.29, and they are therefore denied.

E. U.S. Patent No. 7,706,830

1. Identification of the Patent and Ownership by InterDigital

5.30. ZTE admits that the '830 patent on its face is entitled "Method and Subscriber Unit for Performing an Access Procedure," and that it states on its face that it issued on April 27, 2010, to inventors Fatih Ozluturk and Gary Lomp. ZTE admits that the '830 patent states on its face that it is based on Patent Application No. 12/116,263, filed on May 7, 2008, and claims

priority to, *inter alia,* Utility Application No. 08/670,162, now U.S. Patent No. 5,841,768, filed on June 27, 1996.

5.31. ZTE admits that the '830 patent appears to have six independent claims and twenty-four dependent claims. ZTE admits that claims 1-3, 5-8, 10, 16-18, 20-23, and 25 are being asserted in this Complaint against Samsung and are not being asserted against Nokia, Huawei, and ZTE. ZTE admits that Complainant asserted the '830 patent against ZTE in a previous investigation. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the remaining allegations in paragraph 5.31, and they are therefore denied.

5.32. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.32, and they are therefore denied.

5.33. ZTE admits that the Complaint purports to be accompanied by copies of the prosecution history of the'830 patent and copies of all cited references.

2. Non-Technical Description of the Patent

5.34. ZTE denies the statements and allegations of paragraph 5.34 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.34 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.34, and they are therefore denied.

5.35. ZTE denies the statements and allegations of paragraph 5.35 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.35 to the extent

that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.35, and they are therefore denied.

3. Foreign Counterparts to the Patent

5.36. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.36, and they are therefore denied.

F. U.S. Patent No. 8,009,636

1. Identification of the Patent and Ownership by InterDigital

5.37. ZTE admits that the '636 patent on its face is entitled "Method and Apparatus for Performing an Access Procedure," and that it states on its face that it issued on August 30, 2011, to inventors Fatih Ozluturk and Gary Lomp. ZTE admits that the '636 patent states on its face that it is based on Patent Application No. 11/169,488, filed on June 29, 2005, and claims priority to, *inter alia,* Utility Application No. 08/670,162, now U.S. Patent No. 5,841,768, filed on June 27, 1996.

5.38. ZTE admits that the '636 patent appears to have six independent claims and thirty-three dependent claims. ZTE admits that claims 1-4, 6-9, and 29-31 are being asserted in this Complaint against Samsung and are not being asserted against Nokia, Huawei, and ZTE. ZTE admits that Complainant asserted the '636 patent against ZTE in a previous investigation. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the remaining allegations in paragraph 5.38, and they are therefore denied.

5.39. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.39, and they are therefore denied.

5.40. ZTE admits that the Complaint purports to be accompanied by a certified copy and three copies of the prosecution history of the '636 patent and four copies of all cited references.

2. Non-Technical Description of the Patent

5.41. ZTE denies the statements and allegations of paragraph 5.41 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.41 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.41, and they are therefore denied.

5.42 ZTE denies the statements and allegations of paragraph 5.42 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.42 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.42, and they are therefore denied.

3. Foreign Counterparts to the Patent

5.43. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.43, and they are therefore denied.

G. U.S. Patent No. 7,502,406

1. Identification of the Patent and Ownership by InterDigital

5.44. ZTE admits that the '406 patent on its face is entitled "Automatic Power Control System for a Code Division Multiple Access (CDMA) Communications System," and that it states on its face that it issued on March 10, 2009, to inventors John Kowalski, Gary Lomp, and Fatih Ozluturk. ZTE admits that the '406 patent states on its face that it is based on Patent Application No. 10/084,007, filed on February 27, 2002, and claims priority to, *inter alia,* Provisional Application No. 60/000,775, filed on June 30, 1995.

5.45. ZTE admits that the '406 patent appears to have six independent claims and thirty-four dependent claims. ZTE admits that claims 1-2, 6-9, 13, 15-16, 20-22, 26, 28-30, 34-36 and 40 are being asserted in this Complaint against Samsung and are not being asserted against Nokia, Huawei, and ZTE. ZTE admits that Complainant asserted the '406 patent against ZTE in a previous investigation. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the remaining allegations in paragraph 5.45, and they are therefore denied.

5.46. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.46, and they are therefore denied.

5.47. ZTE admits that the Complaint purports to be accompanied copies of the prosecution history of the '406 patent and copies of all cited references.

2. Non-Technical Description of the Patent

5.48. ZTE denies the statements and allegations of paragraph 5.48 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.48 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of

the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.48, and they are therefore denied.

5.49. ZTE denies the statements and allegations of paragraph 5.49 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the statements and allegations contained in paragraph 5.49 to the extent that they relate in any way to a proposed construction of any of the terms of any of the claims of the Asserted Patents or relate to the validity and enforceability of the claims. Subject to the preceding denials, ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.49, and they are therefore denied.

3. Foreign Counterparts to the Patent

5.50. ZTE lacks sufficient knowledge or information in the present investigation to admit or deny the allegations in paragraph 5.50, and they are therefore denied.

VI. LICENSES

6.1. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 6.1, and they are therefore denied.

VII. UNLAWFUL AND UNFAIR ACTS OF RESPONDENTS – PATENT INFRINGEMENT

7.1 ZTE admits the Complaint accuses products that are wireless devices with at least 3G and/or 4G cellular wireless capabilities. ZTE denies the statements and allegations of paragraph 7.1 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this

Investigation. Subject to the preceding denials, ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.1, and they are therefore denied.

A. Samsung

7.2. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.2, and they are therefore denied.

7.3. ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.3, and they are therefore denied.

7.4. ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.4, and they are therefore denied.

7.5. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.5, and they are therefore denied.

7.6. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.6, and they are therefore denied.

7.7. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.7, and they are therefore denied.

7.8. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.8, and they are therefore denied.

7.9. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.9, and they are therefore denied.

7.10. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.10, and they are therefore denied.

7.11. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.11, and they are therefore denied.

7.12. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.12, and they are therefore denied.

7.13. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.13, and they are therefore denied.

7.14. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.14, and they are therefore denied.

7.15. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.15, and they are therefore denied.

7.16. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.16, and they are therefore denied.

7.17. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.17, and they are therefore denied.

B. Nokia

7.18. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.18, and they are therefore denied.

7.19. ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.19, and they are therefore denied.

7.20. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.20, and they are therefore denied.

7.21. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.21, and they are therefore denied.

7.22. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.22, and they are therefore denied.

7.23. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.23, and they are therefore denied.

7.24. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.24, and they are therefore denied.

7.25. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.25, and they are therefore denied.

7.26. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.26, and they are therefore denied.

C. ZTE

7.27. ZTE denies the statements and allegations of paragraph 7.27 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require

no response. ZTE denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation. Subject to the preceding denials, ZTE admits that certain ZTE wireless devices operate in at least 3G and/or 4G systems. While ZTE admits that a particular device may satisfy the compliance tests for a particular standard, ZTE denies that such devices necessarily implement or support every feature, section, excerpt, portion, example, figure, or diagram contained in the standard. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.27, and they are therefore denied.

7.28. ZTE denies the statements and allegations of paragraph 7.28 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation. Subject to the preceding denials, ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE denies the content of the charts as unsubstantiated documentation and commentary.

7.29. ZTE admits the Complaint includes the 4G Hotspot, Avail, Flash, JetPack 890L as examples of the ZTE accused devices. ZTE denies the statements and allegations of paragraph 7.29 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the remaining allegations and further denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation.

7.30. ZTE denies the statements and allegations of paragraph 7.30 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require

no response. ZTE denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation. Subject to the preceding denials, ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE denies the content of the chart as unsubstantiated documentation and commentary.

7.31. ZTE denies the statements and allegations of paragraph 7.31 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation. Subject to the preceding denials, ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE denies the content of the chart as unsubstantiated documentation and commentary.

7.32. ZTE denies the statements and allegations of paragraph 7.32 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation. Subject to the preceding denials, ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE denies the content of the charts as unsubstantiated documentation and commentary.

7.33. ZTE denies the statements and allegations of paragraph 7.33 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the remaining allegations and further denies that any accused products

infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation.

7.34. ZTE denies the statements and allegations of paragraph 7.34 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the remaining allegations and further denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation.

7.35. ZTE denies the statements and allegations of paragraph 7.35 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. Subject to the preceding denials, ZTE admits that certain ZTE wireless devices are designed to be used in at least 3G, and/or 4G systems.While ZTE admits that a particular device may satisfy the compliance tests for a particular standard, ZTE denies that such devices necessarily implement or support every feature, section, excerpt, portion, example, figure, or diagram contained in the standard. ZTE denies the remaining allegations and further denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation.

7.36. ZTE denies the statements and allegations of paragraph 7.36 to the extent that they contain opinions and legal arguments rather than factual assertions, and, therefore, require no response. ZTE denies the remaining allegations and further denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE in this Investigation.

7.37. ZTE admits that it has had knowledge of one or more of the '966, '847, and/or '151 patents since before this Complaint was filed and admits service of this Complaint provides notice of these patents.

D. Huawei

7.38. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.38, and they are therefore denied.

7.39. ZTE admits that InterDigital has attached to the Complaint documents it purports to be claim charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.39, and they are therefore denied.

7.40. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.40, and they are therefore denied.

7.41. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.41, and they are therefore denied.

7.42. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.42, and they are therefore denied.

7.43. ZTE admits that InterDigital has attached to the Complaint documents it purports to be charts. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 7.43, and they are therefore denied.

7.44. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.44, and they are therefore denied.

7.45. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.45, and they are therefore denied.

7.46. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.46, and they are therefore denied.

7.47. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.47, and they are therefore denied.

7.48. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 7.48, and they are therefore denied.

VIII. SPECIFIC INSTANCES OF UNFAIR IMPORTATION AND SALE

A. Samsung

8.1. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.1, and they are therefore denied.

8.2. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.2, and they are therefore denied.

8.3. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.3, and they are therefore denied.

8.4. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.4, and they are therefore denied.

8.5. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.5, and they are therefore denied.

8.6. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.6, and they are therefore denied.

8.7. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.7, and they are therefore denied.

8.8. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.8, and they are therefore denied.

B. Nokia

8.9. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.9, and they are therefore denied.

8.10. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.10, and they are therefore denied.

8.11. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.11, and they are therefore denied.

8.12. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.12, and they are therefore denied.

C. ZTE

8.13. ZTE admits its is importing, selling for importation, and/or selling within the United States after importation, wireless devices with 3G and/or 4G capabilities. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 8.13 and they are therefore denied.

8.14. Denied.

8.15. ZTE denies that attachments EE and FF of Exhibit 52 to the Complaint include a copy of a receipt for the purchase of a ZTE 4G Hotspot wireless device, and a series of photographs of the wireless device and of the box in which the wireless device was delivered. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 8.15, and they are therefore denied.

8.16. ZTE admits that attachments GG and HH of Exhibit 52 to the Complaint appear to include a copy of a receipt for the purchase of a ZTE JetPack 890L wireless device, and a

series of photographs of the wireless device and of the box in which the wireless device was delivered. ZTE admits that the label on the box appears to disclose a ZTE logo, as does a label on the device itself. ZTE admits that a label on the outside of the wireless device appears to state that the wireless device was made in China. Subject to the foregoing, ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 8.16, and they are therefore denied.

8.17. ZTE admits that attachments II and JJ of Exhibit 52 to the Complaint appear to include a copy of a receipt for the purchase of a ZTE Avail wireless device, and a series of photographs of the wireless device and of the box in which the wireless device was delivered. ZTE admits that a label on the outside of the wireless device appears to state that the wireless device was made in China. Subject to the foregoing, ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 8.17, and they are therefore denied.

8.18. ZTE admits that attachments KK and LL of Exhibit 52 to the Complaint appear to include a copy of a receipt for the purchase of a ZTE Flash wireless device, and a series of photographs of the wireless device and of the box in which the wireless device was delivered. ZTE admits that a label on the outside of the wireless device appears to state that the wireless device was made in China. Subject to the foregoing, ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 8.18, and they are therefore denied.

D. Huawei

8.19. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.19, and they are therefore denied.

8.20. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.20, and they are therefore denied.

8.21. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.21, and they are therefore denied.

8.22. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.22, and they are therefore denied.

8.23. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.23, and they are therefore denied.

8.24. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 8.24, and they are therefore denied.

IX. HARMONIZED TARIFF SCHEDULE ITEM NUMBERS

9.1. Admitted.

X. THE DOMESTIC INDUSTRY

10.1 ZTE is without sufficient knowledge or information in this investigation to admit or deny the allegations in paragraph 10.1 and Complainant fails to demonstrate that a domestic industry exists or is in the process of being established in the United States in accordance with Section 337(a)(2) and (a)(3), in connection with each of the Asserted Patents, therefore, the allegations in paragraph 10.1 are denied.

10.2. ZTE lacks sufficient knowledge or information in this investigation to admit or deny the allegations in paragraph 10.2 and Complainant fails to demonstrate that a domestic industry exists with respect to lnterDigital's activities in the United States, therefore, the allegations in paragraph 10.2 are denied.

10.3 ZTE lacks sufficient knowledge or information in this investigation to admit or deny the allegations in paragraph 10.3, and they are therefore denied.

10.4 ZTE lacks sufficient knowledge or information in this investigation to admit or deny the allegations in paragraph 10.4, and they are therefore denied.

10.5. ZTE admits that the Commission considered certain licensing investments by InterDigital in Investigation Nos. 337-TA-601 and 337-TA-613 but lacks sufficient knowledge or information to admit or deny whether it was the same licensing program as Complainant asserts in the Complaint. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 10.5 and Complainant fails to demonstrate that a domestic industry exists as required under 19 U.S.C. § 1337(a)(2) and defined under 19 U.S.C. § 1337(a)(3), therefore the allegations in paragraph 10.5 are denied.

10.6. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 10.6 and Complainant fails to demonstrate that a domestic industry exists as required under 19 U.S.C. § 1337(a)(2) and defined under 19 U.S.C. § 1337(a)(3), therefore the allegations in paragraph 10.6 are denied.

10.7. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 10.7 and Complainant fails to demonstrate that a domestic industry exists as required under 19 U.S.C. § 1337(a)(2) and defined under 19 U.S.C. § 1337(a)(3), therefore, the allegations in paragraph 10.7 are denied.

XI. RELATED LITIGATION

11.1. ZTE admits that InterDigital filed a complaint in the District of Delaware alleging infringement of each of the patents asserted in this Complaint by Samsung, Nokia, ZTE, and Huawei. ZTE denies that any accused products infringe any valid or enforceable claim of any

patent asserted by InterDigital against ZTE. ZTE lacks sufficient knowledge or information to admit or deny the remaining allegations in paragraph 11.1, and they are therefore denied.

11.2. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 11.2, and they are therefore denied.

11.3. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 11.3, and they are therefore denied.

11.4. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 11.4, and they are therefore denied.

11.5. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 11.5, and they are therefore denied.

11.6. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 11.6, and they are therefore denied.

11.7. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 11.7, and they are therefore denied.

11.8. ZTE lacks sufficient knowledge or information to admit or deny the allegations in paragraph 11.8, and they are therefore denied.

11.9. If and to the extent any response is necessary, ZTE admits the allegations of paragraph 11.9, but denies that any accused products infringe any valid or enforceable claim of any patent asserted by InterDigital against ZTE.

11.10. If and to the extent any response is necessary, ZTE admits the allegations of paragraph 11.10.

11.11. If and to the extent any response is necessary, ZTE admits the allegations of paragraph 11.11.

XII. REQUESTED RELIEF

12.1 If and to the extent any response is necessary, ZTE admits that Complainant InterDigital has made the requests referenced in this paragraph, but denies that Complainant is entitled to any such remedy, as it may relate to ZTE and its business. ZTE further denies that Complainant is entitled to any relief whatsoever as a result of this Investigation, including because it is contrary to public interest.

AFFIRMATIVE STATEMENT CONCERNING REMEDY

ZTE asserts that issuing the relief requested in the Complaint would be contrary to the public interest. Specifically, Complainants' assertion of declared essential patents ("SEPs") as the basis to request exclusion of wireless devices from U.S. commerce would be contrary to the public interest. With respect to this affirmative statement, ZTE adopts and incorporates by reference its Seventh through Twelfth Affirmative Defenses below.

AFFIRMATIVE DEFENSES

ZTE asserts the following affirmative and other defenses. Discovery of Complainants has just begun at the time of this Response, and therefore ZTE has not yet had sufficient time and opportunity to collect and review all the information that may be relevant to the matters and issues raised herein. Accordingly, under 19 U.S.C. §§ 210.14(b) and 210.l4(c), ZTE reserves the right to seek to amend, modify, and/or expand these defenses and to take further positions as discovery proceeds in this Investigation.

First Affirmative Defense: Non-Infringement

1. ZTE does not infringe any valid and enforceable claim of the Asserted Patents. ZTE does not practice any asserted claims of the Asserted Patents.

Second Affirmative Defense:
Invalidity

A. United States Patent No. 7,190,966

2. The asserted claims of the '966 Patent are each invalid for failure to meet the requirements of 35 U.S.C. §§ 101, 102, 103, and/or 112.

3. Based on information and belief, and subject to further discovery, the asserted claims of the '966 Patent are invalid under 35 U.S.C. §§ 102 and/or 103, based on at least at least the prior art references cited by the examiner during prosecution of the '966 Patent and related applications; prior art references disclosed by InterDigital during prosecution of those applications; and/or including one or more of the following prior art references, taken alone or in combination:

- Wideband Spread Spectrum Digital Technologies Standards, Ejzak et al., Telecommunications Industry Association Subcommittee TR-45.5, Apr. 14, 1997
- "Closed-loop power control in CDMA systems; Lee, C.C.; Steele, R.,
- A CDMA-based radio access design for UMTS, Andermo et al., IEEE Journal on Personal Communications, vol. 2, No. 1, pgs. 48-53 (February 1995)
- A coherent detection system with a suppressed pilot channel for DS/CDMA systems, Sadayuki Abeta, Seiichi Sampei and Norihiko Morinaga (Faculty of Engineering, Osaka Univ.), The Transaction of the Institute of Electronics, Information and Communication Engineers, Vol. J77-B-II No.11 Nov. 1994
- A Comparison of CDMA Techniques for Third Generation Mobile Radio Systems, Swales, et al., IEEE, 1993
- A Comparison of Pseudo-Noise and Conventional Modulation for Multiple-Access Satellite Communications," IBM Journal, pp. 241-255, (Jul. 1965).
- A New Acquisition Scheme for DS Spread Spectrum System Using a Saw Convolver, Shi et al., IEEE Global Telecommunications Conference, pp. 611-614 (Nov. 15-18, 1987).
- A New Approach to Long Code Acquisition in Spread Spectrum Radio, Glisic et al., IEEEConference Record, pp. 1281-1285 (Nov. 1991).
- A New Slotted Aloha Based Random Access Method for CDMA Systems, Esmailzadeh et al., 1997 IEEE 6th International Confer-ence on Universal Personal Communications Record, vol. 1, pp. 43-47 (Oct. 12-16, 1997).
- A Simple, Accurate Method To Calculate Spread Spectrum Multiple-Access Error Probabilities, IEEE Transactions On Communications, vol. 40, No. 3, pp. 461-464, (IEEE, Mar. 1992).
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- A transmission experiment on coherent multicode DS-CDMA mobile radio access, Yukihiko Okumura, Akihiro Higashi, Tomohiro Dohi, Koji Ohno, Fumiyuki Adachi

(NTT Mobile Communications), The Institute of Electronics, Information and Communication Engineers, Technical Report, Vol.95, No.310, Oct. 1995
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- An All-Digital Receiver for Satellite Audio Broadcasting Signals Using Trellis Coded Quasi-Orthogonal Code-Division Multiplexing, European Transactions on Telecommunications and Related Technologies, vol. 4 , No. 1, pp. 23-32, (Feb. 1993).
- An Analysis of CDMA with Imperfect Power Control", IEEE 42nd Vehicular Technology Conference, vol. 2, pp. 977-980 (May 1993).
- An Open Multi-Rate Radio Interface based on DS-CDMA," RACE Mobile Telecommunications Workshop at 123 (June 1993)
- Association of Radio Industries and Business (ARIB), Specifications of Air-Interface for 3G Mobile System, vol. 3, ver. 1.0, (Jan. 14, 1999).
- Automatic transmitting power control for outage-free digital microwave radio, Takao Okuno, Mitsuhiro Baba, Masaaki Fukushi, Takahiko Miyajima (NTT Radio Communication Systems Lab.), NTT R&D Vol.39 No.39, Nov. 1990
- Baseband Processing for the CODIT Testbed, Chau et al., RACE Mobile Telecommunications Workshop at 244 (May 1994)
- Broadband-CDMA: ONEPHONE for a Wireless Twenty First Century, IEEE International Conference on Personal Wireless Communications, pp. 1-5 (Aug. 18-19, 1994).
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- Capacity Analysis of Spectrally Overlaid Multiband CDMA Mobile Networks, Jeong et al., IEEE Transactions on Vehicular Technology, vol. 47, No. 3, pp. 798-807 (Aug. 1998).
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- E.P. Patent No. 0678991
- E.P. Patent No. 0682423
- E.P. Patent No. 0688479
- E.P. Patent No. 0744876
- E.P. Patent No. 0748061
- E.P. Patent No. 0774179
- E.P. Patent No. 0777933
- E.P. Patent No. 0827675
- E.P. Patent No. 0847634
- E.P. Patent No. 0895676
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- E.P. Patent No. 22170
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4. The asserted claims of the '847 Patent are each invalid for failure to meet the requirements of 35 U.S.C. §§ 101, 102, 103, and/or 112.

5. Based on information and belief, and subject to further discovery, the asserted claims of the '847 Patent are invalid under 35 U.S.C. §§ 102 and/or 103, based on at least at least the prior art references cited by the examiner during prosecution of the '847 Patent and related applications; prior art references disclosed by InterDigital during prosecution of those applications; and/or including one or more of the following prior art references, taken alone or in combination:

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6. The asserted claims of the '151 Patent are each invalid for failure to meet the requirements of 35 U.S.C. §§ 101, 102, 103, and/or 112.

7. Based on information and belief, and subject to further discovery, the asserted claims of the '151 Patent are invalid under 35 U.S.C. §§ 102 and/or 103, based on at least at least the prior art references cited by the examiner during prosecution of the '151 Patent and related applications; prior art references disclosed by InterDigital during prosecution of those applications; and/or including one or more of the following prior art references, taken alone or in combination:

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- U.S. Patent No. 5,237,610
- U.S. Patent No. 5,301,247
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Third Affirmative Defense:
Lack of Unfair Act

8. ZTE has committed no unfair acts.

Fourth Affirmative Defense:
Lack of Domestic Industry

9. Complainant cannot prove that a domestic industry exists or is in the process of being established in connection with any of the Asserted Patents, as required by §§ 1337(a)(2) and 1337(a)(3).

Fifth Affirmative Defense:
Prosecution Laches

10. Complainants' claims are barred in whole or in part by delay in prosecuting the patent applications that matured into the Asserted Patents.

11. One or more of the Asserted Patents have a purported filing date of more than ten years before the date Complainant requested this Investigation.

12. Complainant, based on its representations that one or more of the Asserted Patents claim benefit under 35 U.S.C. § 120 to a series of continuation applications, could have claimed the subject matter now recited in the asserted claims of one or more of the Asserted Patents at any time since the respective, purported effective filing date(s) the Asserted Patent(s).

Sixth Affirmative Defense:
Prosecution History Estoppel

13. By reason of acts, admissions, and statements before the USPTO made by or on behalf of applicants for the Asserted Patents during prosecution of the patent applications that matured into the Asserted Patents, Complainants are estopped from claiming ZTE infringes one or more of the Asserted Patents.

Seventh Affirmative Defense:
Patent Misuse

14. On information and belief, Complainants are barred from asserting the Asserted Patents by the equitable doctrine of patent *misuse*. Complainants and ZTE are members of the relevant standards-setting organizations ("SSOs"), including the European Telecommunications Standardization Institute ("ETSI"). Like other SSOs, ETSI's Intellectual Property Rights Policy ("IPR Policy") requires each ETSI member to identify all patents the member holds that may be essential to compliance with a proposed technology standard and state whether it will license

such patents on fair, reasonable and non-discriminatory ("FRAND") terms. Having declared the Asserted Patents essential to the UMTS standard in accordance with ETSI's procedures, Complainants failed to comply with their obligations under the IPR Policy, including by failing to propose FRAND terms for the Asserted Patents it claims are essential. Complainants' conduct constitutes anticompetitive behavior and an unfair trade practice.

15. Prior to the institution of this Investigation, and during relevant time periods, InterDigital was a member of various SSOs, including ETSI and, as a member of ETSI, participated in 3GPP standards-setting activities.

16. ETSI is an SSO and is responsible for the standardization of information and communication technologies for the benefit of its members and third parties. 3GPP is a collaborative activity through a group of recognized SSOs (its "Organizational Partners"), including ETSI. 3GPP develops technical specifications subsequently presented to and adopted as standards by its Organizational Partners, such as ETSI.

17. Like other SSOs, ETSI and 3GPP have developed IPR Policies designed to mitigate the risk of anticompetitive acts by IPR owners seeking to hold-up or exploit the standard-setting process. In the absence of FRAND licensing obligations, an IPR owner might knowingly watch its patented technology become incorporated into a standard, then demand unreasonable license fees or even refuse to license altogether and seek injunctive relief against any party that implements the standard (and correspondingly, its patented technology). SSO IPR Policies are designed to obtain FRAND licensing obligations from IPR owners to ensure that IPR owners will not use their IPR to extract unreasonable license fees or to exclude any market participant that is willing to accept a license for use of the IPR on FRAND terms and conditions.

18. ETSI's IPR Policy is set forth in Annex 6 of its Rules of Procedure. Clause 4.1 of the ETSI IPR Policy requires ETSI members to declare all essential IPR in a timely manner. Clause 15 of ETSI's IPR Policy defines IPR to mean "any intellectual property right conferred by statute law including applications therefor other than trademarks." Therefore, market participants have a reasonable expectation that all potentially essential patents or patent applications will be disclosed to ETSI. Clause 6 of ETSI's IPR Policy governs the availability of licenses to essential IPR, stating that upon a declaration of essentiality, ETSI shall immediately request an "undertaking in writing that [the IPR owner] is prepared to grant irrevocable licenses on fair, reasonable, and non-discriminatory terms." Clause 8 of ETSI's IPR Policy states that, if an IPR owner refuses the FRAND commitment, ETSI will select an alternative technology to incorporate into the standard, or will stop work entirely on the standard if no alternative is available.

19. As a collaborative activity among its Organizational Partners (including ETSI), 3GPP requires its members to abide by the IPR policies of their respective Organizational Partner. Article 55 of the 3GPP Working Procedures states that "Individual Members shall be bound by the IPR Policy of their respective Organizational Partner," and that "Individual Members should declare at the earliest opportunity, any IPRs which they believe to be essential, or potentially essential, to any work ongoing within 3GPP. Declarations should be made by Individual Members to their respective Organizational Partners."

20. As a 3GPP "Individual Member," InterDigital was "bound by the IPR Policy" of ETSI, the "Organizational Partner" through which InterDigital participated in 3GPP.

21. InterDigital has explicitly declared to ETSI that the 151 Patent is essential to one or more 3G and/or 4G standards, and explicitly has undertaken "to grant irrevocable licenses

under the IPRs on terms and conditions which are in accordance with Clause 6.1 of the ETSI IPR Policy," *i.e.*, on FRAND terms.

22. InterDigital also failed to comply with its obligations to license the 151 Patent pursuant to the November 2, 1994 Patent License Agreement with Qualcomm Incorporated and with undertakings that were or should have been made to other SSOs, including without limitation the Telecommunications Industry Association ("TIA"), pursuant to the November 2, 1994 Patent License Agreement with Qualcomm Incorporated. Based on these obligations and undertakings, InterDigital is precluded from seeking injunctive relief against Nokia.

23. Having declared the 151 Patent essential to the relevant standard in accordance with SSO procedures, and having correspondingly committed to licensing such patents on FRAND terms, InterDigital's present claims are barred by the equitable doctrine of patent misuse.

Eighth Affirmative Defense:
Breach of Contract

24. Complainants breached their undertakings and obligations to ETSI and any other SSOs responsible for the UMTS standard, as well as to ZTE as beneficiaries of such undertakings and commitments, by seeking an exclusion order on the Asserted Patents even though ZTE had not breached any provision of the ETSI IPR Policy.

Ninth Affirmative Defense:
Equitable and Promissory Estoppel

25. Complainants' claims are barred in whole or in part based on equitable and/or promissory estoppel based on its failure to propose FRAND terms for the Asserted Patents it claims are essential as required by ETSI, ZTE's reliance on Complainants' obligation to adhere

to ETSI's IPR policy, and ZTE's detriment as a result of Complainants' failure to honor its obligation.

Tenth Affirmative Defense:
Unclean Hands

26. The Asserted Patents are void and unenforceable by reason of the equitable doctrine of unclean hands based (among other things) on Complainants' failure to comply with ETSI rules and obligations and failure to propose FRAND terms for the Asserted Patents it claims are essential.

Eleventh Affirmative Defense:
Express or Implied License

27. Complainants are barred from asserting the Asserted Patents because ZTE is licensed to practice the Asserted Patents as a result of Complainants' disclosure of and irrevocable offer to license the Asserted Patents according to FRAND terms in accordance with the ETSI IPR Policy.

Twelfth Affirmative Defense:
Waiver

28. Complainants' claims are barred in whole or in part because Complainants knowingly waived its right to seek injunctive or other exclusionary relief through its commitments made to ETSI that it would seek only FRAND compensation against willing licensees for the use of its declared-essential patents and through its failure to offer or to conclude a FRAND license. In committing to grant irrevocable licenses to its declared-essential patents in exchange for FRAND compensation, Complainants knowingly relinquished its right to seek injunctive relief against willing licensees for the alleged infringement of the 151 Patent. Complainants' claims are also barred by its failure to comply with undertakings that were or

should have been made pursuant to any contract or settlement including the November 2, 1994 license between InterDigital and Qualcomm. InterDigital has thus waived any right to enforce the 151 Patent.

Thirteenth Affirmative Defense:
Inequitable Conduct

29. On information and belief, as alleged below, the 151 Patent, including all of the claims asserted against ZTE, is unenforceable under the doctrine of inequitable conduct.

30. In particular, during prosecution of the 151 Patent, at least two of the three named inventors, Marian Rudolf and Stephen Dick, deliberately withheld printed publications demonstrating that the subject matter of one or more claims of the 151 Patent was invented earlier by other participants in the organization responsible for developing the LTE cellular standard. If those publications had been disclosed to the Patent and Trademark Office (PTO), as required by rules of PTO practice, one or more claims of the 151 Patent would not have been allowed.

31. Marian Rudolf, Stephen Dick and Phillip J. Pietraski are listed as inventors on the 151 Patent.

32. The 151 Patent claims priority to a provisional application filed on Nov. 18, 2003.

33. InterDigital Technology Corporation is identified as the assignee on the face of the 151 Patent.

34. Cellular standards, such as the LTE standard that InterDigital accuses of infringing the 151 Patent, are developed by "Standards-Setting Organizations" (SSOs), made up of participants from companies, such as InterDigital and the Respondents in this investigation, that do business in the cellular space.

35. Cellular standards are complex, and govern many aspects of the operation of cellular devices and cellular network equipment. Each section of a standard is developed by a "working group" with expertise in the technical field for that section. For example, certain working groups have expertise in the efficient use of the radio frequency spectrum, and contribute to the portions of the standard that include the RF specification. Other working groups have expertise in other areas, such as the way in which data is encoded for accurate and efficient transmission over the air.

36. The working group responsible for developing the portion of the LTE standard accused of infringing the 151 Patent is called TSG Radio Access Network Working Group 1 ("TSG-RAN Working Group 1", hereinafter referred to as the "working group") and the group met on multiple occasions in 2002 and 2003 to discuss proposals for the standard under development at the time (high-speed uplink packet access). Prior to each such discussion, the members of the working group drafted written submissions outlining their proposals. Those submissions were distributed to all of the members of the working group, including representatives from InterDigital and at least two of the named inventors on the 151 Patent, Marian Rudolf and Stephen Dick.

37. Two of the named inventors, Marian Rudolf and Stephen Dick, also attended many of the Working Group 1 meetings that occurred just before the 151 Patent's claimed priority date. Marian Rudolf attended Working Group 1 meetings held on October 8, 2002, November 5, 2002, January 7, 2003, February 18, 2003, May 19, 2003, August 25, 2003, October 6, 2003, and November 7, 2003. *See* Exhibits B-I. Stephen Dick attended Working Group 1 meetings on October 8, 2002, November 5, 2002, August 25, 2003, and November 7, 2003. *See* Exhibits B, C, G, I.

38. One of the issues addressed by Working Group 1 was how to efficiently assign network resources to multiple cellular devices, all of which need to send and receive data. *See* Exhibit J.

39. A cellular network shares the available transmission "bandwidth" (i.e., the network's capacity for sending and receiving data) among multiple cellular devices. The allocation of bandwidth is under the control of the cellular network; when a cellular telephone wants to send and receive data such as emails or text messages, it must first ask the network for a share of the available bandwidth.

40. The network responds to the cellular telephone's request for bandwidth by sending messages on a special "channel" that is dedicated to sending "control" messages to cellular telephones, sometimes referred to as a control channel.

41. In many cases, the control channel is shared by multiple cellular devices. When multiple cellular devices share a control channel, each device must be able to receive and interpret messages that are addressed to it. The 151 Patent explains how that was done for the downlink control channel in the version of the standard (Release 5) that predates the one accused of infringement in this investigation. In that previous version, called "HSDPA" the downlink control channel sent control messages out to multiple cellular devices, and distinguished among those devices by using a user specific identification. 151 Patent at 1:24–28, 1:54–55 (describing the prior art "HSDPA" method of identifying a specific "WTRU" (UE) in an HS-SCCH transmission, as part of "Release 5 (R5)" WCDMA systems). The user specific identification was used to mask a cyclic redundancy check (CRC) value. *Id.* This description of using a masked, device-specific CRC value is in the "Background" section of the specification of the 151 Patent, and was known in the prior art. *Id.* at 1:24–2:12 (discussing alleged problems with

prior art cellular systems, including the prior art HS-SCCH system employing the WTRU-specific CRC value.).

42. It is possible to employ a first control channel for sending a message to a cellular device indicating when it is allowed to download data, also known as "downlink," and a second control channel to instruct a cellular device when it may upload data, also known as "uplink."

43. In late 2002 and early 2003, the working group discussed using a single control channel for sending messages to cellular devices about the assignment of both uplink and downlink bandwidth. The single control channel under discussion during that time period would also be shared by multiple cellular devices. It was therefore suggested that, when the network sent out messages on the control channel, each cellular device would successfully interpret only those messages that are addressed to it.

44. In particular, in October, 2002, at a TSG-RAN Working Group 1 meeting attended by Marian Rudolf and Stephen Dick, Motorola submitted a proposal for how to use a single control channel to transmit control messages for both the uplink and downlink directions. *See* Exhibit K (hereinafter the "Motorola Proposal"). The Motorola Proposal is titled "Uplink enhancements for dedicated transport channels."

45. The Motorola Proposal suggests using the control channel previously used for downlink transmissions—a control channel called the "HS-SCCH"—to send messages related both to downlink transmissions (on the downlink channel called the "HS-DSCH") and to uplink transmissions (on an uplink channel called "EUDTC"). The relevant passage is as follows:

> "6. Control channel design to support EUDTC:
>
> One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH. The second option is to define a new set of control

> channels to support EUDTC operation. Finally, the third option is to use 10 msec frame size. Further, the design of control channels when the UE is in soft-handoff should be addressed." Motorola Proposal at 2 (emphasis added).

46. As can be seen from the underlined portion, the Motorola Proposal suggests "piggyback[ing]" the uplink control information onto the existing downlink control channel, thus sharing the same control channel for messages pertaining to transmission in the uplink and downlink directions.

47. The Motorola Proposal also defines how to do so: by having a frame format for transmissions pertaining to the uplink direction that is different from the format used for transmissions pertaining to the downlink direction: "This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH."

48. Finally, the Motorola Proposal make clear that it will "use the control channels for Rel-5 HS-DSCH" (i.e., the prior art "Release 5" version of the HSDPA standard) to distinguish between particular UEs receiving signals on the shard control channel. As discussed above in the context of the admitted prior art in the Background section of the 151 Patent, the control channel used to govern transmission on the "HS-DSCH" in Release 5 of HSPDA—the HS-SCCH—used a UE-specific CRC value.

49. In sum, the Motorola Proposal teaches using a single control channel for transmitting both uplink and downlink messages, distinguishing between uplink and downlink messages using different message "formats," and identifying a specific recipient for the message by using a device-specific CRC value as specified in the previous "Release 5" version of the standard.

50. Marian Rudolf and Stephen Dick attended the Working Group 1 meeting at which the Motorola Proposal was presented and received copies of the Motorola Proposal. Marian

Rudolf and Stephen Dick were aware as of October 2002 that the scheme of using a single control channel for both the uplink and the downlink, and distinguishing between uplink control transmissions and downlink control transmissions through the use of different message formats, was already invented by others. *See* Exhibit B.

51. In January 2003, at a TSG-RAN Working Group 1 meeting attended by Marian Rudolf, Siemens submitted a proposal for how to use a single "control channel" to transmit messages to multiple cellular devices and grant individual cellular devices permission to transmit in the uplink and downlink directions. *See* Exhibit L (hereinafter the "Siemens Proposal").

52. The Siemens Proposal discloses using a single control channel to send both uplink and downlink control information. In particular, the Siemens Proposal suggests re-using the preexisting downlink control channel (the "HS-SCCH") to send messages pertaining both to the downlink channel (the "HS-DSCH") and to the uplink channel (the "EU-DCH"):

> 2. Re-use of HS-SCCH
>
> Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. This is achieved by reusing the downlink HS-SCCH also for downlink control information of EU-DCH (denoted as EU-SCCH in the sequel). Consequently, EU-SCCH uses also a 3-slot format and is time-aligned at Node B with HS-SCCH transmissions. This particular format for EU-DCH associated downlink control information allows the same shared control channel to be used for EU-DCH and HSDPA users in time multiplex.

Siemens Proposal at 1 (emphasis added).

53. Moreover, the Siemens Proposal points out that transmissions pertaining to the downlink direction can be distinguished from transmissions pertaining to the uplink direction by making use of pre-existing data structures used to store the "channelisation code-set field" which previously contained 7 bits of data representing the channelization code set. *Id.* By using a

value for the channelization code set that was "unused" in the previous version of the standard, the Siemens Proposal allows the network to specify to a cellular device (referred to in the Siemens Proposal as "user equipment," or "UE") that the transmission relates to the uplink (EU-DCH) direction: "As shown in Fig. 1, the HS-SCCH part 1 provides 8 unused codewords within the channelisation code-set field (denoted as "redundant area" in Fig. 1, [1]), which could be used for EU-DCH downlink signalling." *Id.* Figure 1 is a table showing the unused codes, in the "Redundant area":

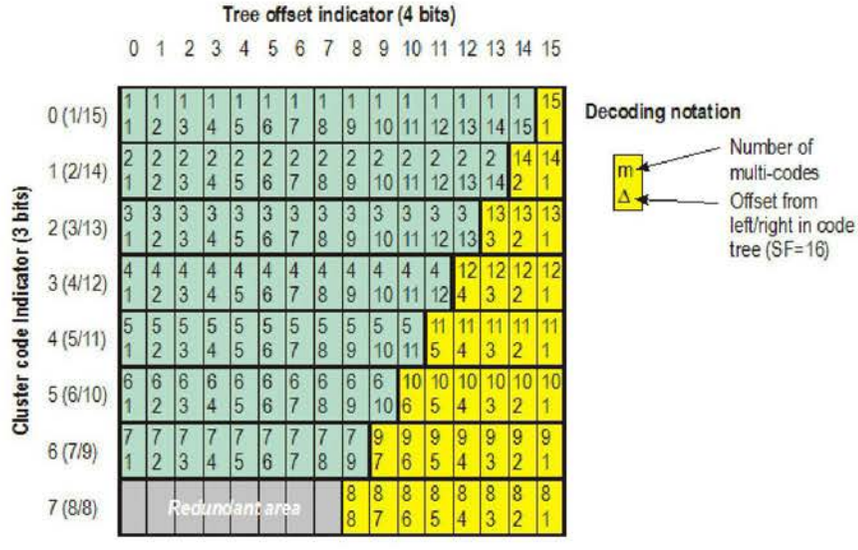


Fig 1: Reuse of the redundant area of HS-SCCH part 1 for downlink signalling of EU-DCH

54. Finally, the Siemens Proposal suggests using the pre-existing HS-SCCH coding format to specify the particular user equipment ("UE") that is intended to receive the transmission. "A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. . . . A major benefit of the re-use of HS-SCCH channel and coding format is that the detection based on the implicit UE-ID and decoding of part 1 is identical for HSDPA and EU-DCH data transmission and receiver implementation is notably simplified." Siemens Proposal at 1–2. As discussed above, as admitted in the Background

section of the 151 Patent, the existing coding structure for HS-SCCH used a UE-specific CRC value that is generated from Part 1 and Part 2 of the HS-SCCH.

55. In sum, the Siemens Proposal teaches using a single control channel for both uplink and downlink messages, distinguishing between uplink and downlink messages using different message "formats," and identifying a specific recipient for the message by using the preexisting coding structure of HS-SCCH, as specified in the previous HSDPA version of the standard.

56. Marian Rudolf attended the Working Group 1 meeting at which the Siemens Proposal was presented and received copies of the Siemens Proposal. Marian Rudolf was aware as of January 2003 that the scheme of using a single control channel for both the uplink and the downlink, by distinguishing between uplink control transmissions and downlink control transmissions through the use of the "unused" codewords in the previous version of the standard, was already invented by others. *See* Exhibit D.

57. InterDigital filed a provisional application with the PTO on November 18, 2003. *See* Exhibit M (hereinafter the "Provisional Application"). The Provisional Application is titled "Novel Resource Assignment Channel Configuration for Enhanced Uplink Operation." *Id.* at 7.

58. Like the Motorola Proposal and the Siemens Proposal, the Provisional Application describes a way to use a single shared control channel to send transmissions pertaining to both the downlink and uplink directions: "The foregoing and other shortcomings of the prior art are resolved by providing a high speed shared control channel (HS-SCCH) and an uplink (UL) resource assignment channel in a shared downlink (DL) radio resource space, and by distinguishing received high speed shared control channel (HS-SCCH) transmissions from

uplink (UL) resource assignment channel transmissions." Provisional Application ¶ 0018 (emphasis added here and in all cases below).

59. One of the preferred embodiments of the Provisional Application is identical in all relevant respects to the shared control channel described in the Siemens Proposal, and several embodiments use the Motorola Proposal's approach to distinguishing between the uplink and downlink directions.

60. Both the Motorola Proposal and the Provisional Application describe using a single control channel that employs conventional HS-SCCH transmissions for the downlink (i.e., the same transmissions used in the prior art Release 5 version of the standard) and UL Resource Assignment transmissions for the uplink. Likewise, both the Siemens Proposal and the Provisional Application describe using a single control channel that employs conventional HS-SCCH transmissions for the downlink (i.e., the same transmissions used in the prior art version of the HSDPA standard) and UL Resource Assignment transmissions for the uplink (emphasis added in all cases).

Provisional Application	**Motorola Proposal**	**Siemens Proposal**
"The foregoing and other shortcomings of the prior art are resolved by providing a high speed shared control channel (HS-SCCH) and an uplink (UL) resource assignment channel in a shared downlink (DL) radio resource space, and by distinguishing received high speed shared control channel (HS-SCCH) transmissions from uplink (UL) resource assignment channel transmissions." ¶ 0018.	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. This is achieved by reusing the downlink HS-SCCH also for downlink control information of EU-DCH (denoted as EU-SCCH in the sequel)." Siemens Proposal at 1.

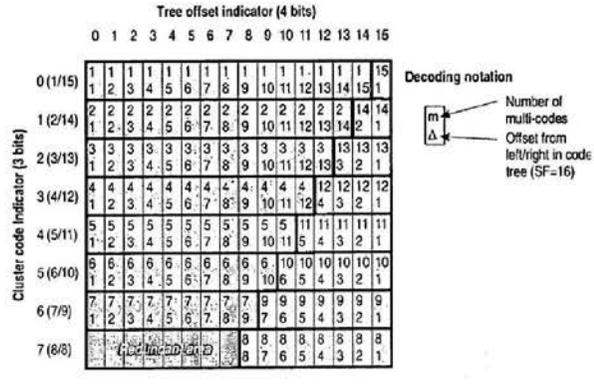
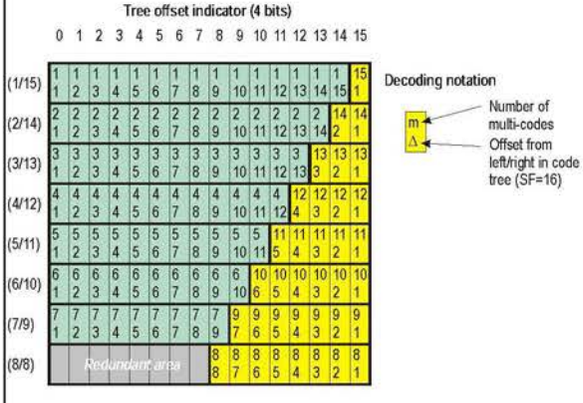
61. In several embodiments of the Provisional Application, and in the Motorola Proposal, the UE can, in the phrasing used by the Provisional Application, "distinguish" between transmissions related to the downlink and transmissions related to the uplink by looking at the format of the frame transmitted on the shared control channel. In at least the first, second, and third disclosed embodiments of the Provisional Application, the direction for the control signal is specified by the frame format.

Provisional Application	**Motorola Proposal**
"Pursuant to the techniques of the present invention, any of several methods may be employed to distinguish HS-SCCH transmissions from DL Resource Assignment channel transmissions. These methods include: (a) channel indication by means of selecting one or more 'impossible' combinations in channelization code set mapping, (b) inversion of UE-specific cyclic redundancy check (CRC), (c) utilizing different UE-specific masking sequences . . ." Provisional Application ¶ 0020; *see generally* ¶¶ 0033–0035 (describing "Method 1," "Method 2," and "Method 3" for distinguishing between the uplink and downlink channels).	"This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.

62. Likewise, in the first embodiment of the Provisional Application, and in the Siemens Proposal, the UE can distinguish between transmissions related to the downlink and transmissions related to the uplink by using special values in an unused field in the previous version of the HSDPA standard. Both the Provisional Application and the Siemens Proposal explain how this distinguishing can take place: by looking to see whether one of the fields of the transmission—the "channelisation code-set" field—is one of eight codewords that are "unused" or "impossible" in the prior art implementation:

Provisional Application	Siemens Proposal
"Pursuant to the techniques of the present invention, any of several methods may be employed to distinguish HS-SCCH transmissions from DL Resource Assignment channel transmissions. These methods include: (a) channel indication by means of selecting one or more 'impossible' combinations in channelization code set mapping . . ." Provisional Application ¶ 0020; *see generally* ¶ 0033 (describing "Method 1" for distinguishing between the uplink and downlink channels, using "One or more 'Impossible' Combinations in the Channelization Code Set Mapping").	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. This is possible if the signalling payload is four bits or less. As shown in Fig. 1, the HS-SCCH part 1 provides 8 unused codewords within the channelisation code-set field (denoted as 'redundant area' in Fig. 1, [1]), which could be used for EU-DCH downlink signalling." Siemens Proposal at 1.

63. Indeed, the figure used to depict the "impossible combinations" in the Provisional Application is copied and pasted from the figure used in the Siemens Proposal to depict the "8 unused codewords":

Provisional Application	Siemens Proposal
 FIG. 2	 Fig. 1

64. Finally, in both the Motorola Proposal and the Siemens proposal, the shared downlink channel relies on the same prior art method for confirming which UE a transmission is

directed to that is used in the Provisional Application: using the user-specific identification in the same manner it was used in the preexisting HS-SCCH structure.

Provisional Application	Motorola Proposal	Siemens Proposal
"Confirmation that a demodulated transmission is intended for the UE is obtained using a UE-specific CRC." ¶ 0025. "The R5 HS-SCCH is sent . . . along with a UE-specific cyclic redundancy check (CRC) (see 3GPP TS25.212)." ¶ 0008 (discussing the HS-SCCH in the prior art HSDPA system).	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used." "A major benefit of the re-use of HS-SCCH channel and coding format is that the detection based on the implicit UE-ID and decoding of part 1 is identical for HSDPA and EU-DCH data transmission and receiver implementation is notably simplified." Siemens Proposal at 1–2.

65. Moreover, both the Provisional Application and the Siemens Proposal argue that transmitting uplink control messages on the same channel already used for downlink control messages has performance and efficiency benefits—namely, the UE can have reduced complexity and better performance because it only needs to monitor a single control channel.

Provisional Application	Siemens Proposal
"In a straightforward extension of existing R5 mechanisms, UL Resource Assignment Channel's for FDD Enhanced UL could be introduced 'on top' of existing HS-SCCH's for HSDPA. In other words, a separate set of SF=128 DL channels are configured to contain one or more UL Resource Assignment Channels. With this approach, in a typical HSDPA operation scenario, a UE would then be required to monitor one or several UL Resource Assignment Channels in addition to the up to	"Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. . . . Additionally it decreases UE complexity, since less control channels need to be monitored in cases where HS-DSCH and EU-DCH are used concurrently." Siemens Proposal at 1.

4 HS-SCCHs it must already monitor." ¶ 0014. "Relative to the prior art approaches described hereinbefore, a high speed shared control channel (HS-SCCH) and an uplink (UL) resource assignment channel that occupy a shared downlink (DL) radio resource space reduces UE complexity increases UE battery efficiency, and permits enhanced DL spreading code usage." ¶ 0019.	

66. Thus the Provisional Application, like the Motorola Proposal and the Siemens Proposal, describes using a single control channel for both uplink and downlink messages, distinguishing between uplink and downlink messages using different message formats (including, as in the Siemens Proposal, different values for the "channelization code set" field), and identifying a specific recipient for the message by using the pre-existing HS-SCCH coding structure, which included a device-specific CRC value. And the Provisional Application and the Siemens Proposal cite precisely the same benefits from doing so.

67. The Provisional Application also includes claims. Claim 1 purports to cover the process already disclosed in the Motorola Proposal and the Siemens Proposal:

> 1. A method for communicating with a user equipment (UE) over a wireless link comprised of a downlink (DL) and an uplink (UL), the method comprising the steps of:
>
> (a) sharing at least a portion of the DL so as to provide a high speed shared control channel (HS-SCCH) and an UL resource assignment channel, and
>
> (b) distinguishing received high speed shared control channel (HS-SCCH) transmissions from uplink (UL) resource assignment channel transmissions.

68. This claim recites the same basic three elements already discussed: a control channel for both "HS-SCCH" and "uplink (UL)" control messages; "distinguishing"

transmissions related to the HS-SCCH from transmissions related to the uplink; and "sharing" the channel among multiple UEs. This claimed process is identical to what is disclosed in the Motorola Proposal and the Siemens Proposal.

69. InterDigital filed the nonprovisional application, which ultimately issued as the 151 Patent, on July 29, 2004. *See* Exhibit N. Both the Motorola Proposal and the Siemens Proposal describe preferred embodiments of the 151 Patent. And like the Provisional Application, the 151 Patent includes material taken directly from the Siemens Proposal.

70. In particular, both the 151 Patent and the Motorola Proposal describe using a single control channel that employs conventional HS-SCCH transmissions for the downlink (i.e., the same transmissions used in the prior art Release 5 version of the standard) and UL Resource Assignment transmissions for the uplink. Likewise, both the 151 Patent and the Siemens Proposal describe using a single control channel that employs conventional HS-SCCH transmissions for the downlink (i.e., the same transmissions used in the prior art version of the HSDPA standard) and UL Resource Assignment transmissions for the uplink.

151 Patent	**Motorola Proposal**	**Siemens Proposal**
"The WTRU communicates with the Node-B via a common control channel, the UL channel and the DL channel. The WTRU receives a message from the Node-B via the common control channel. The message includes an indication of whether the message is intended for assigning radio resources to the UL charmel or the DL channel." 2:20–25. "The Node-B 104 is configured to support an	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. This is achieved by reusing the downlink HS-SCCH also for downlink control information of EU-DCH (denoted as EU-SCCH in the sequel)." Siemens Proposal at 1.

HSDPA and EU operation. Therefore, each Node-B 104 dynamically allocates radio resources for DL and UL transmissions to and from the WTRU 106 through an HS-DSCH and an EU channel, respectively. The radio resources assignment information for both the HS-DSCH and the EU is transmitted through the common control channel 112." 3:33–39. "High speed downlink packet access (HSDPA) has been developed to increase downlink (DL) efficiency and throughput in universal mobile telecommunication system (UMTS) Release 5 (R5) wideband code division multiple access (W-CD MA) systems. . . . The signaling channel, a high speed shared control channel (HS-SCCH), conveys radio resource allocation information to a plurality of wireless transmit/receive units (WTRUs)." 1:33–36.		

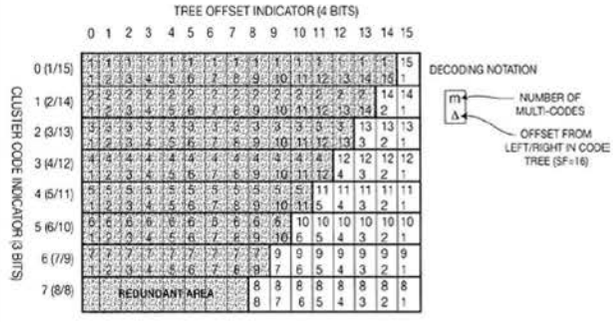
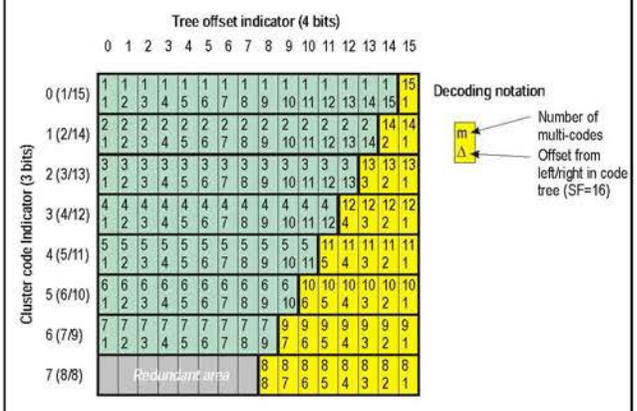
71. In several embodiments of the 151 Patent, as in the Motorola Proposal, the UE can distinguish between transmissions related to the downlink and transmissions related to the uplink by looking at the format of the frame transmitted on the shared control channel. In at least the first, second, and third disclosed embodiments of the 151 Patent, the direction for the control signal is specified by the frame format.

151 Patent	Motorola Proposal
"In accordance with a first embodiment of the present invention, an indication that a particular radio resource is assigned for a UL transmission is provided by means of one or more of the impossible combinations in the channelization code set mapping in a current HSDPA." 3:51–55. "In accordance with the second embodiment of the present invention, this WTRU-specific CRC is modified in a unique and deterministic way to indicate that the demodulated transmission is for UL transmission, rather than DL transmission." 4:13–16. "In accordance with a third embodiment of the present invention, an indication that a particular radio resource is assigned for an EU is provided by means of a WTRU -specific masking sequence." 4:28–31.	"This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.

72. Also, as in the Siemens Proposal, the 151 Patent describes distinguishing between transmissions related to the downlink and transmissions related to the uplink, using the channelization code-set field.

151 Patent	Siemens Proposal
"In accordance with a first embodiment of the present invention, an indication that a particular radio resource is assigned for a UL transmission is provided by means of one or more of the impossible combinations in the channelization code set mapping in a current HSDPA. FIG. 2 is a look-up table for channelization code set mapping currently used in the HSDPA." 3:51–57.	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. This is possible if the signalling payload is four bits or less. As shown in Fig. 1, the HS-SCCH part 1 provides 8 unused codewords within the channelisation code-set field (denoted as 'redundant area' in Fig. 1, [1]), which could be used for EU-DCH downlink signalling." Siemens Proposal at 1.

73. Figure 2 from the 151 Patent is carried over from Figure 2 of the Provisional Application, which in turn is taken from Figure 1 of the Siemens Proposal.

151 Patent	Siemens Proposal
 FIG. 2	 Fig. 1

74. Finally, in both the Motorola Proposal and the Siemens proposal, the shared downlink control channel relies on the same prior art method for determining which UE a transmission is directed to that is used in the 151 Patent: preexisting structure of the HS-SCCH and specifically the use of user specific identification (UE-ID), which was used in the preexisting structure to mask the CRC.

151 Patent	Motorola Proposal	Siemens Proposal
"In accordance with a second embodiment of the present invention, an indication that a particular radio resource is assigned for UL transmission is provided by means of a WTRU-specific CRC. Under current HSDPA specifications, a WTRU-specific CRC is contained in an HS-SCCH field 2. A 16-bit CRC is computed from the information to be transmitted,	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used." "A major benefit of the re-use of HS-SCCH channel and coding format is that the detection based on the implicit UE-ID and decoding of part 1 is identical for HSDPA and EU-DCH data transmission

and the computed CRC is masked with a unique 16-bit WTRU identity (ID). The masked CRC is transmitted to a WTRU 106 as a WTRU-specific CRC." 4:4–12.		and receiver implementation is notably simplified." Siemens Proposal at 1–2.

75. As with the Provisional Application, the 151 Patent argues that transmitting uplink control messages on the same channel already used for downlink control messages has the performance and efficiency benefits discussed in the Siemens Proposal—namely, the UE can have reduced complexity and better performance because it only needs to monitor a single control channel.

151 Patent	**Siemens Proposal**
"Thus, it is possible to introduce a separate set of SF=128 DL channels as UL resource assignment channels. With this approach, a WTRU would be required to monitor one or more UL resource assignment channels in addition to the HS-SCCHs for an HSDPA operation. Although this approach is conceptually simple, there are many disadvantages with this scheme, such as WTRU complexity, WTRU battery efficiency, and DL spreading code usage." 2:3–9 (describing disadvantages of using two separate control channels, which are alleged to be overcome by the claimed invention).	"Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. . . . Additionally it decreases UE complexity, since less control channels need to be monitored in cases where HS-DSCH and EU-DCH are used concurrently." Siemens Proposal at 1.

76. Moreover, at least asserted independent claims 1 and 16 purport to cover the process already disclosed in the Motorola Proposal and in the Siemens Proposal.

77. The Motorola Proposal and the Siemens Proposal disclose a control channel for both downlink and uplink channel assignment information:

Claims	Motorola Proposal	Siemens Proposal
1. A method for utilizing channel assignment information for an uplink shared channel or a downlink shared channel, the method comprising: a wireless transmit/receive unit (WTRU) receiving downlink control information including downlink or uplink channel assignment information via a same physical downlink control channel, both downlink channel assignment information and uplink channel assignment information being received via the same physical downlink control channel;	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. This is achieved by reusing the downlink HS-SCCH also for downlink control information of EU-DCH (denoted as EU-SCCH in the sequel)." Siemens Proposal at 1.

Claims	Motorola Proposal	Siemens Proposal
16. A wireless transmit/receive unit (WTRU) for utilizing channel assignment information for an uplink shared channel or a downlink shared channel, the WTRU comprising: a receiver configured to receive downlink control information including downlink or uplink channel assignment information via a same physical downlink control channel, both downlink channel assignment information and uplink channel assignment information being received via the same physical downlink control channel;	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. This is achieved by reusing the downlink HS-SCCH also for downlink control information of EU-DCH (denoted as EU-SCCH in the sequel)." Siemens Proposal at 1.

78. The Motorola Proposal and the Siemens Proposal disclose "determining" whether the downlink control information is intended for the UE.

Claims	Motorola Proposal	Siemens Proposal
1. …the WTRU determining whether the downlink control information is intended for the WTRU based on WTRU identity (ID)-masked cyclic redundancy check (CRC) parity bits…	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2; *see* 151 Patent at 1:24–2:12 (indicating that the "HS-SCCH" uses a CRC value specific to a WTRU to distinguish transmissions to that WTRU).	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. . . . A major benefit of the re-use of HS-SCCH channel and coding format is that the detection based on the implicit UE-ID and decoding of part 1 is identical for HSDPA and EU-DCH data transmission and receiver implementation is notably simplified." Siemens Proposal at 1–2; *see* 151 Patent at 1:24–2:12 (indicating that "HSDPA" uses a CRC value specific to a WTRU to distinguish transmissions to that WTRU).

Claims	Motorola Proposal	Siemens Proposal
16. … a controller configured to determine whether the downlink control information is intended for the WTRU based on WTRU identity (ID)-masked cyclic redundancy check (CRC) parity bits…	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2; *see* 151 Patent at 1:24–2:12 (indicating that the "HS-SCCH" uses a CRC value specific to a WTRU to	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. . . . A major benefit of the re-use of HS-SCCH channel and coding format is that the detection based on the implicit UE-ID and decoding of part 1 is identical for HSDPA and EU-DCH data transmission and receiver implementation is notably simplified." Siemens Proposal

	distinguish transmissions to that WTRU).	at 1–2; *see* at 1:24–2:12 (indicating that "HSDPA" uses a CRC value specific to a WTRU to distinguish transmissions to that WTRU).

79. As discussed above, it was known in the admitted prior art (described in the 151 Patent) that the existing "HSDPA" specifications use a WTRU-specific CRC in the "HS-SCCH" channel to identify transmissions intended for a particular WTRU.

Claims	**Meaning of "HSDPA" to a Person of Ordinary Skill in the Art**
1. …the WTRU determining whether the downlink control information is intended for the WTRU based on WTRU identity (ID)-masked cyclic redundancy check (CRC) parity bits…	"Under current HSDPA specifications a WTRU-specific CRC is contained in an HS-SCCH field 2." 151 Patent 4:7–8; *id.* 1:49–55 (indicating that the "HS-SCCH" uses a CRC value specific to a WTRU to distinguish transmissions to that WTRU); *id.* 1:24–2:12 (indicating that "HSDPA" uses a CRC value specific to a WTRU to distinguish transmissions to that WTRU).

Claims	**Meaning of "HSDPA" to a Person of Ordinary Skill in the Art**
16. … a controller configured to determine whether the downlink control information is intended for the WTRU based on WTRU identity (ID)-masked cyclic redundancy check (CRC) parity bits…	"Under current HSDPA specifications a WTRU-specific CRC is contained in an HS-SCCH field 2." 151 Patent 4:7–8; *id.* 1:49–55 (indicating that the "HS-SCCH" uses a CRC value specific to a WTRU to distinguish transmissions to that WTRU); *id.* 1:24–2:12 (indicating that "HSDPA" uses a CRC value specific to a WTRU to distinguish transmissions to that WTRU).

80. The Motorola Proposal and the Siemens Proposal disclose "determining" whether the channel assignment information is for uplink or downlink and utilizing that information:

Claims	Motorola Proposal	Siemens Proposal
1. … if so determining whether the channel assignment information is for assigning radio resources for the uplink shared channel or the downlink shared channel; and the WTRU utilizing the radio resources for the uplink shared channel or the downlink shared channel.	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. This is possible if the signalling payload is four bits or less. As shown in Fig. 1, the HS-SCCH part 1 provides 8 unused codewords within the channelisation code-set field (denoted as 'redundant area' in Fig. 1, [1]), which could be used for EU-DCH downlink signalling." Siemens Proposal at 1.

Claims	Motorola Proposal	Siemens Proposal
16. … determine whether the channel assignment information is for assigning radio resources for the uplink shared channel or the downlink shared channel, and utilizing the radio resources for the uplink shared channel or the downlink shared channel.	"One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH." Motorola Proposal at 2.	"A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. This is possible if the signalling payload is four bits or less. As shown in Fig. 1, the HS-SCCH part 1 provides 8 unused codewords within the channelisation code-set field (denoted as 'redundant area' in Fig. 1, [1]), which could be used for EU-DCH downlink signalling." Siemens Proposal at 1.

81. On information and belief, but for the applicants' deliberate decision to withhold the Motorola Proposal and the Siemens Proposal from the 151 Patent examiner, the PTO would not have allowed at least asserted claims 1 and 16 of the 151 Patent. The Motorola Proposal and the Siemens Proposal, by themselves or in combination with the admitted prior art, disclose each and every element of these claims—indeed, the Siemens Proposal teaches the specific method of

distinguishing between uplink and downlink used in an embodiment of the 151 Patent, and describes that method using precisely the same figure.

82. On information and belief, the decision to withhold the Motorola Proposal and the Siemens Proposal was deliberate, and made with fraudulent intent. At least inventors Marian Rudolf and Stephen Dick were specifically aware of the Motorola Proposal, as they attended the Working Group 1 meeting at which the Motorola Proposal was presented. At least inventor Marian Rudolf was specifically aware of the Siemens Proposal, as he attended the Working Group 1 meetings at which the Siemens Proposal was presented. In addition, 3GPP working group documents for any given meeting are distributed prior to the meeting to the appropriate working group or to those persons registered as regular participants—including other named inventors on the 151 Patent. Given that multiple inventors were actively involved with TSG-RAN Working Group 1 and regularly attended Working Group 1 meetings, they were clearly aware of the Siemens Proposal and the Motorola Proposal.

83. The inventors' awareness of the Motorola Proposal is also evident from the inclusion of a related Motorola submission in the cited prior art for the 151 Patent. In particular, the cited prior art for the 151 Patent includes a publication titled "3GPP TSG RANWG 1 Tdoc R1-02-1350, Motorola, 'Design Considerations for Enhanced Uplink Dedicated Channel,' Shanghai, China, Nov. 2002." 151 Patent at p. 2. The 1350 proposal cites the Motorola Proposal discussed above. *See* Exhibit O at 1, 5.

84. The inventors' awareness of the Siemens Proposal is also evident from the Provisional Application and the specification of the 151 Patent themselves, which (as already discussed) take the idea of using the "unused" values of the channelization code-set field and the figure used to illustrate that idea directly from the Siemens Proposal.

85. On information and belief, knowing that disclosing the Motorola Proposal and /or the Siemens Proposal would prohibit obtaining a patent, at least inventor Rudolf and inventor Dick made the conscious choice not to disclose the prior art to the PTO. The inventors disclosed several working group documents to the Examiner from other meetings attended by the inventors and occurring around the same time as the Motorola Proposal and the Siemens Proposal—including the related 1350 proposal—but at least Marian Rudolf and Stephen Dick chose not to disclose the Motorola Proposal and the Siemens Proposal to the PTO.

86. For example, both Marian Ruldolf and Stephen Dick attended the Working Group 1 meeting in Shanghai, China, held November 2002, and disclosed the following working documents associated with this meeting to the PTO: (1) Tdoc R1-02-1277, Nokia, "Two Threshold Node B Packet Scheduling," Shanghai, China, Nov. 2002; (2) Tdoc R1-02-1350, Motorola, "Design Considerations for Enhanced Uplink Dedicated Channel," Shanghai, China, Nov. 2002; and (3) Tdoc R1-02-1277, Nokia, "Two Threshold Node B Packet Scheduling," Shanghai, China, Nov. 2002. *See* Exhibit C. However, Marian Rudolf and Stephen Dick attended the Working Group 1 meeting preceding the Shanghai meeting, held October 2002 in Espoo Finland, and chose not to disclose the highly relevant Motorola Proposal. And Marian Rudolf attended the Working Group 1 meeting following the Shanghai meeting, held January 2003 in San Diego, California, and chose not to disclose the highly relevant Siemens Proposal. *See* Exhibit D.

87. The deliberate choice by at least Marian Rudolf to use material taken from the Siemens Proposal in the first described embodiment of the 151 Patent, and the choice to disclose to the USPTO other Working Group materials while withholding the Siemens Proposal, demonstrate fraudulent intent. The deliberate choice of at least Marian Rudolf and Stephen Dick

to disclose certain Working Group submissions, including the Motorola 1350 proposal, while withholding the directly relevant Motorola Proposal, demonstrates fraudulent intent. The pattern of withholding multiple prior art references that disclose the use of a single control channel and the other requirements of at least claims 1 and 16 of the 151 Patent further demonstrates fraudulent intent. On information and belief, the inventors, including at least Marian Rudolf and Stephen Dick, withheld the Motorola Proposal and the Siemens Proposal with the intent of hiding from the PTO that the alleged inventions of at least claims 1 and 16 of the 151 Patent were not invented by the named inventors, but rather were taken from the prior work of others. As discussed above, but for the inventors' failure to disclose the Motorola Proposal and the Siemens Proposal, at least claims 1 and 16 of the 151 Patent would not have issued.

88. ZTE is continuing to obtain and review information related to the large family of U.S. and foreign patents and publications related to the asserted patent, and accordingly, ZTE intends to set forth further allegations regarding the inequitable conduct associated with the procurement of the asserted patent as discovery continues.

FOURTEENTH AFFIRMATIVE DEFENSE
(Breach of Contract)

89. InterDigital breached their undertakings and obligations to ETSI and 3GPP, as well as to Respondents as beneficiaries of such undertakings and commitments, by failing to follow certain SSO disclosure obligations, by failing provide Respondents with a FRAND offer and to conclude a license on FRAND terms and conditions, and by seeking an exclusionary order on the 151 Patent against Respondents, willing licensees, from importing standard-compliant products into the U.S. through this Investigation, and by failing to comply with undertakings that were or should have been made to any SSO, including TIA, pursuant to any contract or settlement including the November 2, 1994 license between InterDigital and Qualcomm.

FIFTEENTH AFFIRMATIVE DEFENSE
(Unclean Hands)

90. In Commission Investigation No. 337-TA-613, InterDigital accused certain Nokia products of infringing the 579 Patent relating to the UIED functionality in WCDMA mobile phone systems. The claims of the 579 Patent required the accused devices to "descramble" certain data and use a "1/2 rate convolutional encoder" in the process.

91. In response to InterDigital's accusation of infringement, Dr. Apostolos K. Kakaes, an expert witness for Nokia, prepared a 66-page expert report explaining that Nokia did not infringe the 579 Patent. In his expert report, Dr. Kakaes described certain of Nokia's confidential and proprietary trade secret information concerning the UIED functionality of the accused Nokia products, including that the accused products do not descramble data or use a 1/2 rate convolutional encoder.

92. The expert report of Dr. Kakaes, and the Nokia Trade Secrets described therein, were submitted to InterDigital's counsel pursuant to a protective order entered into by the parties and approved by the Court in the 613 Investigation that limited both the individuals to whom confidential business information produced in the 613 Investigation could be disclosed and the purposes for which such confidential business information could be used.

93. The protective order provides, in relevant part:

> Confidential business information is information which has not been made public and which concerns or relates to the trade secrets, processes, operations, style of work, or apparatus, or to the production, sales, shipments, purchases, transfers, identification of customers, inventories, amount or source of any income, profits, losses, or expenditures of any person, firm, partnership, corporation, or other organization, the disclosure of which information is likely to have the effect of either (1) impairing the Commission's ability to obtain such information as necessary to perform its statutory functions, or (2) causing substantial harm to the competitive position of the person, firm, partnership, corporation, or other organization from which the information was obtained, unless the Commission is required by law to disclose such information.

94. Due to the extremely sensitive nature of the Nokia Trade Secrets, and in accordance with the protective order, the front page and the top of every page of Dr. Kakaes's expert report were marked with a legend indicating the following:

> ***MAY CONTAIN CONFIDENTIAL BUSINESS INFORMATION SUBJECT TO PROTECTIVE ORDER***

This legend was appropriate because Dr. Kakaes's expert report contained information which had not been made public and which related to trade secrets, processes, and operations of Nokia's mobile phones.

95. Following an evidentiary hearing in the 613 Investigation, the Administrative Law Judge issued an Initial Determination finding that Nokia did not infringe any of the asserted patents, including the 579 Patent. The ITC adopted his findings on the 579 Patent and InterDigital did not appeal that decision to the Federal Circuit.

96. After the finding that Nokia did not infringe the asserted patents in the 613 Investigation, InterDigital's CEO William Merrit, in reference to the finding, stated that "[w]hile a loss is always disappointing, in patent cases losses can provide valuable information that can result in even stronger patent portfolios going forward." With respect to the 613 Investigation, Mr. Merrit later added that InterDigital was "pursuing additional patents that address the specific issues raised by the ALJ. We are hopeful that we can secure those patents in the next six to 12 months."

97. Upon learning the details of the UIED functionality in Nokia's products, InterDigital continued to prosecute continuations of the 579 Patent, including prosecuting claims that purported to eliminate the requirements of descrambling and of a 1/2 rate convolutional encoder.

98. During the prosecution of the continuations of the 579 Patent, the patent prosecution attorneys who were prosecuting the continuations of the 579 Patent had access to at least a partially redacted copy of Dr. Kakaes's expert report. Dr. Kakaes's expert report contained Nokia's confidential business information, should only have been used for purposes of the 613 Investigation, and should never have been submitted to prosecution counsel for use in connection with a related, continuation application.

99. The attorneys prosecuting the continuations of the 579 Patent included Dr. Kakaes's expert report on information disclosure statements for the continuations of the 579 Patent. The continuations of the 579 Patent ultimately issued as the 013 Patent and the 127 Patent. On information and belief, the prosecuting attorneys used the information contained within the expert report, in the drafting of the claims of the 013 Patent and the 127 Patent that do not require descrambling or a 1/2 rate convolutional encoder.

100. After the issuance of the 013 Patent and the 127 Patent, co-counsel for InterDigital during the 613 Investigation delivered to the Latham firm a draft ITC complaint and exhibits to the draft ITC complaint, including an unredacted version of Dr. Kakaes's expert report. The Latham firm was not permitted to receive any Nokia CBI from the 613 Investigation.

101. On or about July 26, 2011, InterDigital, by and through the Latham firm, filed a complaint with the International Trade Commission leading to Investigation No. 337-TA-800. The 800 Investigation accuses Nokia of infringing, inter alia, the 013 Patent and the 127 Patent. Unlike the other respondents in the 800 Investigation, however, Nokia was not accused of infringing claims of the 013 Patent and the 127 Patent that required descrambling or a 1/2 rate

convolutional encoder. On information and belief, Nokia CBI from the 613 Investigation was used in the selection of the patents and claims asserted against Nokia in the 800 Investigation.

102. In addition to the Complaint in the 800 Investigation, InterDigital filed certified file histories of each of the patents asserted in the 800 Investigation, as well as appendices that InterDigital represented as containing the references cited by the United States Patent and Trademark Office ("USPTO") in connection with the prosecution of each of the patents asserted in the 800 Investigation (337-TA-800 Complaint at ¶¶ 5.5, 5.12, 5.19, 5.26, 5.32, 5.39, 5.46). These appendices were provided to the Commission without any indication that they contained CBI, and were thus publicly available via the ITC's "EDIS" system.

103. The 013 patent reflects that two Kakaes non-infringement reports, which included the first Kakaes report on behalf of Nokia and Samsung and the second report on behalf of only Samsung, were cited as references (Exh. I at 3, 4). It appears that the copy of the first Kakaes report sent to the PTO was a redacted version that did not contain any CBI. However, the appendix which claimed to have the cited reference, filed publicly on EDIS, contained the unredacted Kakaes report branded as Confidential Business Information, which contained the detailed disclosure of Nokia's "brute force" technology.

104. The foregoing demonstrates at least three violations of the 613 Protective Order. First, InterDigital's lawyers distributed Nokia CBI from the 613 Investigation for purposes unrelated to that proceeding – the prosecution and selection of the patents and claims asserted against Nokia in the 800 Investigation. Second, InterDigital's lawyers disclosed Nokia CBI (and that of third parties, such as Qualcomm) to persons not authorized to receive it by publicly filing it on EDIS. Third, the lawyers who violated the Protective Order failed to report all aspects of the violations to the Commission.

105. InterDigital's conduct in prior proceedings before the ITC – the 613 and 800 Investigations – demonstrates a disregard for Commission Rules and procedures. InterDigital should thus be barred, at least by the equitable doctrine of unclean hands, from pursuing any further claims against Nokia in the ITC. Additional discovery, including the depositions of InterDigital's prosecution attorneys, may result in the identification of additional instances of inequitable conduct and additional resulting defenses.

RESPONSE OF ZTE TO NOTICE OF INVESTIGATION AND RULE 210.13(b)

By providing the following information, ZTE intends only to supply data required by 19 C.F.R. § 210.13(b). ZTE specifically denies that any of the information or data supplied below relate to or support any allegations of infringement against ZTE or any violation of 19 U.S.C. § 1337.

Pursuant to Rule 210.13(b), ZTE provides the following additional information:

1. On information and belief, ZTE understands that the articles that are the subject of this investigation may be imported under Harmonized Tariff Schedule of the United States ("HTSUS") Nos. 8517.12 (telephones for cellular or other wireless networks); 8517.62 (machines for the reception, conversion, and transmission of voice, images or other data, including modems); 8517.70 (parts for articles under heading 8517, including telephones for cellular or other wireless networks); and 8471.30 to 8471.80 (automatic data processing machines, including laptop and desktop computers, and components thereof).

2. For the articles identified by Complainants in their Amended Complaint as specifically being involved in this investigation, ZTE's total quantity of articles imported from China in 2012 is stated in Confidential Exhibit A to this Response.

3. ZTE's estimated capacity to produce its accused articles is stated in Confidential Attachment A to this Response.

4. ZTE believes that the United States constitutes a relatively important market for the accused articles.

CONCLUSION

ZTE respectfully requests that the Commission determine and direct that: (i) ZTE has not violated 19 U.S.C. § 1337; (ii) ZTE has not infringed any claim of the Asserted Patents; (iii) the Asserted Patents are invalid and/or unenforceable; (iv) there is no protectable domestic industry in the Asserted Patents; (v) Complainants' request for an exclusion order and a cease and desist order directed to ZTE be denied; (vi) that issuance of relief in this proceeding would be contrary to the public interest; and (vii) ZTE is entitled to such other and further relief as deemed just and proper under the law.

Dated: February 22, 2013

Respectfully submitted,

/s/ Jay H. Reiziss

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Counsel for Respondents
ZTE Corp and ZTE (USA), Inc.

VERIFICATION OF RESPONSE TO THE COMPLAINT

I, James Ray Wood, declare, in accordance with 19 C.F.R. §§ 210.4 and 210.13, under penalty of perjury under the laws of the United States of America, that the following statements are true:

1. I am Chief Patent Officer, ZTE USA, Inc., and am duly authorized to sign this Response;

2. I have read the foregoing Response;

3. To the best of my knowledge, information, and belief, based upon reasonable inquiry, the foregoing is well founded in fact and is warranted by existing law or a non-frivolous argument for the extension, modification, or reversal of existing law or the establishment of new law; and

4. The foregoing Response is not being filed for an improper purpose, such as to harass or to cause unnecessary delay or needless increase in the cost of litigation.

Executed this 20th day of February, 2013

James Ray Wood

PUBLIC VERSION

CONFIDENTIAL EXHIBIT A
(REDACTED)

EXHIBIT B

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1-#28 BIS **Identifier:** 22892

LIST OF REGISTERED ATTENDEES

View Listing View Badges Export to csv

Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Accame, Marco	Attendee	NEC Telecom MODUS Ltd.	NEC Telecom MODUS Ltd.	**Mobile :** **Fixed phone :** +44 1372 381880	No	Yes
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4014	No	Yes
Baker, Matthew	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** **Fixed phone :** +44 7595 968709	Yes	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	Yes
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Berning, Per	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** +46 70 376 22 52 **Fixed phone :** +46 8 404 4681	Yes	Yes
Boumendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	Yes
Chapman, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +46 10 716 5436	Yes	Yes
Chen, Dong	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +86 10 5822 3008	No	Yes
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Das, Arnab	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1 732 949 8595	Yes	Yes
Dick, Steve	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1 6316224001	No	Yes
Drewes, Christian	Attendee	INFINEON TECHNOLOGIES	INFINEON TECHNOLOGIES	**Mobile :** **Fixed phone :** +49 89 234 84227	No	Yes
Ebert, Pamela	Attendee	Vodafone GmbH	Vodafone GmbH	**Mobile :** +49 17 22 10 08 26 **Fixed phone :** +49 211 533 5289	No	Yes
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co.	MELCO MOBILE COMMUNICATIONS	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes
Gerstenberger, Dirk	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes
Ghosh, Amitabha	Attendee	Motorola Inc.	Motorola Inc	**Mobile :** **Fixed phone :** +18476324121	No	Yes
Goudard, Natnalie	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 56 26	Yes	Yes
Grigues Marc	Attendee	ORANGE SA	ORANGE SA	**Mobile :** **Fixed phone :** +33 1 45 29 55 42	No	Yes
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Hoeynck, Andreas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +493038623054	No	Yes

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Kanterakis, Emmanuel	Attendee	GOLDEN BRIDGE TECHNOLOGY INC.	GOLDEN BRIDGE TECHNOLOGY INC.	**Mobile :** **Fixed phone :** +1 732 870 8088	No	Yes
Kawasaki, Yoshihiro	Attendee	FUJITSU Laboratories of Europe	FUJITSU Laboratories of Europe	**Mobile :** **Fixed phone :** +	No	Yes
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Kim, Min-Jung	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-7858	No	Yes
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Le Pezennec, Yannick	Attendee	VODAFONE Group Plc	VODAFONE LTD	**Mobile :** +44 774 893 8886 **Fixed phone :** +34610518600	No	Yes
Le Strat, Evelyne	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33 6 64 04 39 63 **Fixed phone :** +33139445339	No	Yes
Lee, Juho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5115	No	Yes
Liu, Jung-Tao	Attendee	Lucent Technologies	Lucent Technologies	**Mobile :** **Fixed phone :** +1 408 735 8126	Yes	Yes
Ljung, Rickard	Attendee	TeliaSonera AB	TeliaSonera AB	**Mobile :** **Fixed phone :**	No	Yes
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Murphy, Mark	Attendee	TTPCom Ltd	TTPCom Ltd	**Mobile :** **Fixed phone :** +44 1763 266266	Yes	Yes
Ng, Man Hung	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** **Fixed phone :** +44 1793 775025	Yes	Yes
Nielsen, Sari	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358503026833	Yes	Yes
Nishio, Akihiko	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 46 840 5694	No	Yes
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Popovic, Branislav	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 4770813	No	Yes
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Takano, Michiaki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81-467-41-2885	No	Yes
Tarkiainen, Markku	Attendee	NOKIA Corporation	NOKIA GmbH	**Mobile :** **Fixed phone :** +358 50 518 3406	No	Yes
Tong, Wen	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** **Fixed phone :** +1 613 763 1315	No	Yes
Toskala, Antti	Chairman	NOKIA Corporation	NOKIA Corporation	**Mobile :** +358 40 513 2710 **Fixed phone :** +358 40 513 2710	Yes	Yes
Umesh, Anil	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81 468403190	No	Yes
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Any comments or problems with this application? Please let us know...

EXHIBIT C

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1-#29 **Identifier:** 21845

LIST OF REGISTERED ATTENDEES

View Listing View Badges Export to csv

Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Accame, Marco	Attendee	NEC Telecom MODUS Ltd.	NEC Telecom MODUS Ltd.	**Mobile :** **Fixed phone :** +44 1372 381880	No	Yes
Agin, Pascal	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 30 77 32 89	Yes	Yes
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4014	No	Yes
Bang, Seung Chan	Attendee	ETRI	ETRI	**Mobile :** **Fixed phone :** +82 42 860 5515	Yes	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	Yes
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Bolourchi, Nader	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1 631 622 4322	Yes	No
Boumendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	Yes
Buracchini, Enrico	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** **Fixed phone :** +390112287118	Yes	Yes
Cao, Aijun	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 477 0806	No	Yes
Chen, Dong	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +86 10 5822 3008	No	Yes
Cheng, Jon	Attendee	PHILIPS Communication Systems	PHILIPS Communication Systems	**Mobile :** **Fixed phone :** +86 29 8386096	Yes	Yes
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Das, Arnab	Attendee	Alcatel-Lucent	Lucent Technologies Japan Ltd	**Mobile :** **Fixed phone :** +1 732 949 8595	Yes	Yes
De Benedittis, Rossella	Attendee	Nokia Siemens Networks S.p.A.	Nokia Siemens Networks S.p.A.	**Mobile :** **Fixed phone :**	Yes	Yes
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Duan, Jinsong	Attendee	Mitsubishi Electric Co	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81 50 3687 6575	Yes	Yes
Ebert, Pamela	Attendee	Vodafone GmbH	Vodafone GmbH	**Mobile :** +49 17 22 10 08 26 **Fixed phone :** +49 211 533 5289	No	Yes
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fang, Yongnan	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +861068427711	No	Yes
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co	MELCO MOBILE COMMUNICATIONS	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes
Gerstenberger, Dirk	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes

Ghosh, Amitabha	Attendee	Motorola Inc.	Motorola Inc.	**Mobile :** **Fixed phone :** +18476324121	No	Yes
Göransson, Bo	Attendee	Telefon AB LM Ericsson	Ericsson Japan K.K.	**Mobile :** +46 730 311909 **Fixed phone :** +46 10 7170703	Yes	Yes
Griguer, Marc	Attendee	ORANGE SA	ORANGE SA	**Mobile :** **Fixed phone :** +33 1 45 29 55 42	No	Yes
Grovlen, Asbjorn	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +4522886701	Yes	Yes
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Höynck, Andreas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +49 89 722 47473	No	Yes
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Javaudin, Jean-philippe	Attendee	France Telecom	France Telecom	**Mobile :** **Fixed phone :** +33 2 99 12 45 95	Yes	Yes
Jeong, Gibong	Attendee	TEXAS Instruments	TEXAS Instruments	**Mobile :** **Fixed phone :** +1 858 552 2926	Yes	Yes
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Kahtava, Jussi	Attendee	Nokia Japan Co, Ltd	Nokia Japan Co, Ltd	**Mobile :** **Fixed phone :** +447768237616	Yes	Yes
Kaipainen, Yrjö	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358504836514	Yes	Yes
Kanemoto, Hideki	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81-468-40-5697	Yes	Yes
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Kawasaki, Yoshihiro	Attendee	FUJITSU Laboratories of Europe	FUJITSU Laboratories of Europe	**Mobile :** **Fixed phone :** +	No	Yes
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Kim, Youngbum	Attendee	Samsung Electronics Co. Ltd	SAMSUNG Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5092	No	Yes
Kim, Sung-Jin	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 280 6175	No	Yes
Kim, Bong Hoe	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 343 450 4131	No	Yes
Kim, Jung Gon	Attendee	Samsung Electronics Co., Ltd	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +82-31-279-5103	Yes	Yes
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Lee, Juho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5115	No	Yes
Li, Xiaoqiang	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86 10 59253333	Yes	Yes
Liao, Jingyi	Attendee	SAMSUNG China Telecom R&D	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +86 10 68427711 2334	No	Yes
Liu, Jung-Tao	Attendee	Lucent Technologies	Lucent Technologies	**Mobile :** **Fixed phone :** +1 408 735 8126	Yes	Yes
				Mobile :		

Liu, Yang	Attendee	CATT	CATT	**Mobile :** **Fixed phone :** +86 10 62304422 274	Yes	Yes
Ljung, Rickard	Attendee	TeliaSonera AB	TeliaSonera AB	**Mobile :** **Fixed phone :**	No	Yes
Love, Robert	Attendee	Motorola Inc.	Motorola Inc.	**Mobile :** **Fixed phone :** +1 847 523 3702	No	Yes
Lu, Yifeng	Attendee	HUAWEI TECHNOLOGIES Co. Ltd.	CWTS	**Mobile :** **Fixed phone :** +86 755 26935769	No	No
Luo, Zhigang	Attendee	Alcatel-Lucent Shanghai Bell	Alcatel-Lucent Shanghai Bell	**Mobile :** **Fixed phone :** +86-21-58541240-8114	No	Yes
Ma, Mike	Attendee	PHILIPS Semiconductors	PHILIPS Semiconductors	**Mobile :** **Fixed phone :** +8613816333596	No	Yes
Mitra, Diptendu	Attendee	NOKIA UK Ltd	NOKIA UK Ltd	**Mobile :** **Fixed phone :** +441372381812	No	Yes
Mortazavi, Seyed	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44-(0)1794-833618	No	Yes
Moulsley, Tim	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** +44 (0)7749073450 **Fixed phone :** +44 20 8 560 286	Yes	Yes
Murphy, Mark	Attendee	TTPCom Ltd	TTPCom Ltd	**Mobile :** **Fixed phone :** +44 1763 266266	Yes	Yes
Nakamura, Michiharu	Attendee	FUJITSU Laboratories of Europe	Fujitsu Limited	**Mobile :** **Fixed phone :** +44 20 8606 4435	Yes	Yes
Ng, Man Hung	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** **Fixed phone :** +44 1793 775025	Yes	Yes
Nguyen, Phong	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +61 3 9271 4589	Yes	Yes
Nishio, Akihiko	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 46 840 5694	No	Yes
Nurse, Peter	Attendee	Alcatel-Lucent Nederland B.V.	Flarion Technologies	**Mobile :** **Fixed phone :** +1 403 242 3313	No	Yes
Pace, Alessandro	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** +393356339765 **Fixed phone :** +390639009044	Yes	Yes
Park, Youngsoo	Attendee	Samsung Electronics Co., Ltd.	Samsung Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82-31-279 5042	Yes	Yes
Parkvall, Stefan	Attendee	Ericsson AB	Ericsson Inc.	**Mobile :** **Fixed phone :** +46 70 2673452	Yes	Yes
Parsa, Kourosh	Attendee	Parsa Wireless Com. LLC	Parsa Wireless Com. LLC	**Mobile :** **Fixed phone :** +1 203 570 6964	Yes	No
Popovic, Branislav	Attendee	HuaWei Technologies Co., Ltd.	HuaWei Technologies Co., Ltd.	**Mobile :** **Fixed phone :** +46 8 4770813	No	Yes
Ranta-aho, Karri	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 521 0651	No	Yes
Ring, Steffen	Attendee	Motorola Solutions Danmark A/S	MOTOROLA S.A.S.	**Mobile :** +45 4025 1881 **Fixed phone :** +45 4348 8362	Yes	Yes
Roh, Dongwook	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 31 450 4131	No	Yes
Rudolf, Marian	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** +1-514-802-0579 **Fixed phone :** +1 514 904 4589	No	Yes
Sasaki, Tsukasa	SECRETARY	Fujitsu Limited	ETSI	**Mobile :** **Fixed phone :** +81 46 839 5414	Yes	Yes
Schmidl, Tim	Attendee	TEXAS Instruments	TEXAS Instruments	**Mobile :** **Fixed phone :** +1 214 480 4460	No	Yes
Schwagmann, Norbert	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :**	No	Yes
Shen, Yongnan	Attendee	Samsung Electronics Co., Ltd.	Samsung Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +861068427711	No	Yes
Shen, Donglin	Attendee	AT&T Wireless Services, Inc.	AT&T Wireless Services, Inc.	**Mobile :** +1 858-610-9811 **Fixed phone :** +1 858-554-0387(258)	Yes	Yes
Shim, Donghee	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-2-6100-2246	Yes	Yes
Spaling, Gerke	Attendee	Telefon AB LM Ericsson	Ericsson Korea	**Mobile :** **Fixed phone :** +31 53 4505 788	No	Yes
Steudle, Ville	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358718042588	Yes	Yes
Stewart, Kenneth	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 847 877 5761 **Fixed phone :** +1 847 523 5761	Yes	Yes
				Mobile :		

Suzuki, Hidetoshi	Attendee	Panasonic Broadband Comm.	Panasonic Mobile Comm.	**Fixed phone :** +81 50 3686 7942	Yes	Yes
Takano, Nahoko	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81-45-939-2672	Yes	Yes
Takano, Michiaki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81-467-41-2885	No	Yes
Tarkiainen, Markku	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 518 3406	No	Yes
Tatesh, Said	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** +44 7880 786679 **Fixed phone :** +44 1793 77 5093	Yes	Yes
Tian, Guangzhao	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +8610 68423311-2114	No	Yes
Tong, Wen	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** **Fixed phone :** +1 613 763 1315	No	Yes
Toskala, Antti	Chairman	NOKIA Corporation	NOKIA Corporation	**Mobile :** +358 40 513 2710 **Fixed phone :** +358 40 513 2710	Yes	Yes
Umesh, Anil	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81 468403190	No	Yes
Usuda, Masafumi	ViceChairman	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468-40-3190	No	Yes
Virtanen, Anu	Attendee	NOKIA MOBILE PHONES	NOKIA Corporation	**Mobile :** **Fixed phone :** +358-40-5060092	No	Yes
Vujcic, Dragan	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 47 85 41 38	Yes	Yes
Wakabayashi, Hideji	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +441256368812	Yes	Yes
Wang, Yang	Attendee	Alcatel-Lucent Shanghai Bell	Alcatel-Lucent Shanghai Bell	**Mobile :** **Fixed phone :** +8675528780808	Yes	No
Wang, Tong	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +861068427711	No	Yes
Wang, Ke	Attendee	CATT	CATT	**Mobile :** **Fixed phone :** +86 10 82029090	No	Yes
Wang, Hai	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86-010-684277112130	No	Yes
Wang, Ting	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86 10 68427711-2110	No	Yes
Wei, Chao	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +8610-84212828-2673	No	Yes
Wiedmann, Ralf	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :**	No	Yes
Willenegger, Serge	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** +41 79 285 0241 **Fixed phone :** +41 24 436 3540	Yes	Yes
Xu, Bing	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +86 21 50991864	No	Yes
Yan, Aiguo	Attendee	Analog Devices BV	Analog Devices BV	**Mobile :** **Fixed phone :** +781-937-1479	Yes	No
Yan, Guixia	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +861068427711-2112	No	Yes
Zelmer, Donald E.	Attendee	AT&T	AT&T	**Mobile :** +1 404 625-7008 **Fixed phone :** +1 404-499-6426	Yes	No
Zhang, Shuwei	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86-10-68427711-2132	No	Yes
Zhang, Yang	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +861068427711	No	Yes
Zhao, Jing	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86-10-6842771-2112	No	Yes
Zheng, Hongming	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +8610-84212828-2808	No	Yes
Zhu, Yanmin	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86-10-68427711	No	Yes
Zongwang, Li	Attendee	Commit Inc	Commit Inc	**Mobile :** **Fixed phone :** +8621 54424885X3116	No	Yes

Any comments or problems with this application? Please let us know.

EXHIBIT D

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1#30 **Identifier:** 21846

LIST OF REGISTERED ATTENDEES

View Listing View Badges Export to csv

Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Accame, Marco	Attendee	NEC Telecom MODUS Ltd.	NEC Telecom MODUS Ltd.	**Mobile :** **Fixed phone :** +44 1372 381880	No	Yes
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4014	No	Yes
Bader, Uwe	Attendee	ROHDE & SCHWARZ	ROHDE & SCHWARZ	**Mobile :** **Fixed phone :**	No	Yes
Baker, Matthew	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** **Fixed phone :** +44 7595 968709	Yes	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	Yes
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Billy, Nicolas	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 30 77 54 64	No	Yes
Blanz, Josef	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** +49 172 9072128 **Fixed phone :** +49 6326 701230	Yes	No
Bolourchi, Nader	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1 631 622 4322	Yes	No
Bournendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	Yes
Cao, Aijun	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 477 0806	No	Yes
Charpentier, Frédéric	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +49 (0) 30 6686 1788	No	Yes
Chen, Dong	Attendee	Nokia Siemens Networks	Siemens K.K	**Mobile :** **Fixed phone :** +86 10 5822 3008	No	Yes
Cheung, Joseph	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +1 650 616 4338	No	Yes
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Czerepinski, Przemyslaw	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44 7917 087114	Yes	Yes
Das, Arnab	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1 732 949 8595	Yes	Yes
De Benedittis, Rossella	Attendee	Nokia Siemens Networks S.p.A.	Nokia Siemens Networks S.p.A.	**Mobile :** **Fixed phone :**	Yes	Yes
Drewes, Christian	Attendee	INFINEON TECHNOLOGIES	INFINEON TECHNOLOGIES	**Mobile :** **Fixed phone :** +49 89 234 84227	No	Yes
Du, Gaoke	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +86 755 654 0223	Yes	Yes
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co.	MELCO MOBILE COMMUNICATIONS	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes
Gerstenberger, Dirk	Attendee	Telefon A.B.L.M.Ericsson	Telefon A.B.L.M.Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes

Ghosh, Amitabha	Attendee	Motorola Inc	Motorola Inc	**Mobile :** **Fixed phone :** +18476324121	No	Yes
Göransson, Bo	Attendee	Telefon AB LM Ericsson	Ericsson Japan K K	**Mobile :** +46 730 311909 **Fixed phone :** +46 10 7170703	Yes	Yes
Grilli, Francesco	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +1 858 845 3742	Yes	No
Harrison, Mark	Attendee	Motorola Inc.	Motorola Inc.	**Mobile :** **Fixed phone :**	No	Yes
Higa, Yoshito	Attendee	TEXAS Instruments Japan Ltd	TEXAS Instruments Japan Ltd	**Mobile :** **Fixed phone :** +81 3 4331 2026	No	Yes
Hindelang, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** +49 170 318 2770 **Fixed phone :** +49 89 636 73333	Yes	Yes
Horng, Henry	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +1 617 6217554	No	Yes
Howard, Steven	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +1 781 276 0904	Yes	No
Huang, Howard	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1-732-888-7187	No	Yes
Hwang, Seung-Hoon	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 31 450 2945	Yes	Yes
Ibrahim, Nicolas	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 97 61	No	No
Javaudin, Jean-philippe	Attendee	France Telecom	France Telecom	**Mobile :** **Fixed phone :** +33 2 99 12 45 95	Yes	Yes
Kahtava, Jussi	Attendee	Nokia Japan Co, Ltd	Nokia Japan Co, Ltd	**Mobile :** **Fixed phone :** +447768237616	Yes	Yes
Kaipainen, Yrjö	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358504836514	Yes	Yes
Kanemoto, Hideki	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81-468-40-5697	Yes	No
Kanterakis, Emmanuel	Attendee	GOLDEN BRIDGE TECHNOLOGY INC.	GOLDEN BRIDGE TECHNOLOGY INC.	**Mobile :** **Fixed phone :** +1 732 870 8088	No	Yes
Kawasaki, Yoshihiro	Attendee	FUJITSU Laboratories of Europe	FUJITSU Laboratories of Europe	**Mobile :** **Fixed phone :** +	No	Yes
Kim, Youngbum	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5092	No	Yes
Kim, Sung-Jin	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 280 8175	No	Yes
Kim, Bong Hoe	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 343 450 4131	No	Yes
Kim, Jung Gon	Attendee	Samsung Electronics Co., Ltd	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +82-31-279-5103	Yes	Yes
Kistowski, Dirk	Attendee	Telekom Deutschland GmbH	Telekom Deutschland GmbH	**Mobile :** **Fixed phone :** +49 228 936 1 8419	Yes	Yes
Klerer, Mark	Attendee	Flarion Technologies	Flarion Technologies	**Mobile :** **Fixed phone :** +1 908 443 8092	Yes	Yes
Kogiantis, Achilles	Attendee	Lucent Technologies	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1 973 386 4399	Yes	Yes
Kolu, Janne	Attendee	Elektrobit Corporation	Elektrobit Corporation	**Mobile :** **Fixed phone :** +358 400 308121	No	No
Kwak, Yongjun	Attendee	Samsung R&D Institute UK	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5112	No	Yes
Le Pezennec, Yannick	Attendee	VODAFONE Group Plc	VODAFONE Group Plc	**Mobile :** +44 774 893 8886 **Fixed phone :** +34610518600	No	Yes
Le Strat, Evelyne	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33 6 64 04 39 63 **Fixed phone :** +33139445339	No	Yes
Lee, Hee Joung	Attendee	LG Electronics Inc	LG Electronics Inc	**Mobile :** **Fixed phone :** +82 2 530 9866	Yes	No
Lee, Sungho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5045	Yes	Yes
Lee, Juho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5115	No	Yes
Liu, Jung-Tao	Attendee	Lucent Technologies	Lucent Technologies Japan Ltd	**Mobile :** **Fixed phone :** +1 408 735 8126	Yes	Yes
Ljung, Rickard	Attendee	TeliaSonera AB	TeliaSonera AB	**Mobile :** **Fixed phone :**	No	Yes
				Mobile :		

Love, Robert	Attendee	Motorola Inc.	Motorola Inc	**Mobile :** **Fixed phone :** +1 847 523 3702	No	Yes
Macmullan, Samuel	Attendee	TEXAS Instruments	TEXAS Instruments	**Mobile :** **Fixed phone :** +011 7812705600	Yes	No
Malladi, Durga	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +1 858 651 2288	No	Yes
Margulis, Alex	Attendee	Intel Sw eden AB	Intel Corporation (UK) Ltd	**Mobile :** **Fixed phone :** +972-3-920-7024	No	Yes
Michel, Jürgen	Attendee	Nokia Siemens Netw orks	Nokia Siemens Netw orks	**Mobile :** **Fixed phone :** +49 89 722 49911	No	Yes
Mitra, Diptendu	Attendee	NOKIA UK Ltd	NOKIA UK Ltd	**Mobile :** **Fixed phone :** +441372381812	No	Yes
Moon, Yong-Suk	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5390	No	Yes
Ng, Man Hung	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** **Fixed phone :** +44 1793 775025	Yes	Yes
Nishio, Akihiko	Attendee	Panasonic Mobile Comm	Panasonic Mobile Comm	**Mobile :** **Fixed phone :** +81 46 840 5694	No	Yes
Nurse, Peter	Attendee	Alcatel-Lucent Nederland B.V.	Flarion Technologies	**Mobile :** **Fixed phone :** +1 403 242 3313	No	Yes
Ogaw a, Shinsuke	Attendee	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468 40 3530	No	Yes
Onozaw a, Hirashi	Attendee	TEXAS Instruments Japan Ltd	TEXAS Instruments Japan Ltd	**Mobile :** **Fixed phone :** +1 858 404 6458	No	Yes
Pace, Alessandro	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** +393356339765 **Fixed phone :** +390639009044	Yes	Yes
Papasakellariou, Aris	Attendee	TEXAS Instruments	TEXAS Instruments	**Mobile :** **Fixed phone :**	No	Yes
Parkvall, Stefan	Attendee	Ericsson AB	Ericsson Inc.	**Mobile :** **Fixed phone :** +46 70 2673452	Yes	Yes
Popovic, Branislav	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 4770813	No	Yes
Purat, Marcus	Attendee	Nokia Siemens Netw orks	Nokia Siemens Netw orks	**Mobile :** **Fixed phone :** +49 30 386 25367	No	Yes
Ranta-aho, Karri	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 521 0651	No	Yes
Rudolf, Marian	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** +1-514-802-0579 **Fixed phone :** +1 514 904 4589	No	Yes
Sasaki, Tsukasa	SECRETARY	Fujitsu Limited	ETSI	**Mobile :** **Fixed phone :** +81 46 839 5414	Yes	Yes
Sato, Masanori	Attendee	Sony Mobile Com. Japan, Inc.	Sony Mobile Com. Japan, Inc.	**Mobile :** **Fixed phone :** +81-3-5782-5199	No	Yes
Schw agmann, Norbert	Attendee	Nokia Siemens Netw orks	Nokia Siemens Netw orks	**Mobile :** **Fixed phone :**	No	No
Shen, Donglin	Attendee	AT&T Wireless Services, Inc.	AT&T Wireless Services, Inc.	**Mobile :** +1 858-610-9811 **Fixed phone :** +1 858-554-0387(258)	Yes	Yes
Shim, Donghee	Attendee	LG Electronics Inc	LG Electronics Inc	**Mobile :** **Fixed phone :** +82-2-6100-2246	Yes	Yes
Sinha, Pranesh	Attendee	TEXAS Instruments	TEXAS Instruments	**Mobile :** **Fixed phone :** +1-858-845-0163	Yes	Yes
Spaling, Gerke	Attendee	Telefon AB LM Ericsson	Ericsson Korea	**Mobile :** **Fixed phone :** +31 53 4505 788	No	Yes
Steudle, Ville	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358718042588	Yes	Yes
Stew art, Kenneth	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd	**Mobile :** +1 847 877 5761 **Fixed phone :** +1 847 523 5761	Yes	No
Sun, Minying	Attendee	STMicroelectronics	STMicroelectronics	**Mobile :** **Fixed phone :** +65-68709247	No	Yes
Suzuki, Hidetoshi	Attendee	Panasonic Broadband Comm.	Panasonic Broadband Comm.	**Mobile :** **Fixed phone :** +81 50 3686 7942	Yes	Yes
Takano, Nahoko	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81-45-939-2672	Yes	No
Takano, Michiaki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co	**Mobile :** **Fixed phone :** +81-467-41-2885	No	No
Tarkiainen, Markku	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 518 3406	No	Yes
				Mobile : +44 7880 786679		

Tatesh, Said	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Fixed phone :** +44 1793 77 5093	Yes	Yes
Tong, Wen	Attendee	GENBAND TELECOMMUNICATIONS	Nortel Networks (USA)	**Mobile :** **Fixed phone :** +1 613 763 1315	No	Yes
Toskala, Antti	Chairman	NOKIA Corporation	NOKIA Corporation	**Mobile :** +358 40 513 2710 **Fixed phone :** +358 40 513 2710	Yes	Yes
Umesh, Anil	Attendee	NTT DoCoMo	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468403190	No	Yes
Usuda, Masafumi	ViceChairman	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468-40-3190	No	Yes
Van de beek, Jaap	Attendee	HUAWEI TECHNOLOGIES Co. Ltd.	HUAWEI TECHNOLOGIES Co. Ltd.	**Mobile :** **Fixed phone :** +468 4770808	No	Yes
Vujcic, Dragan	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 47 85 41 38	Yes	Yes
Wang, Ting	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +86 10 68427711-2110	No	Yes
Wang, Ke	Attendee	CATT	CATT	**Mobile :** **Fixed phone :** +86 10 82029090	No	No
Willenegger, Serge	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** +41 79 285 0241 **Fixed phone :** +41 24 436 3540	Yes	Yes
Zelmer, Donald E.	Attendee	AT&T	AT&T	**Mobile :** +1 404 625-7008 **Fixed phone :** +1 404-499-6426	Yes	Yes
Zhang, Xiaoxia	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +001 858-6585035	No	Yes

Any comments or problems with this application? Please let us know...

EXHIBIT E

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1#31 **Identifier:** 22954

LIST OF REGISTERED ATTENDEES

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Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Abe, Tetsushi	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81-468-40-3897	No	Yes
Accame, Marco	Attendee	NEC Telecom MODUS Ltd.	NEC Telecom MODUS Ltd.	**Mobile :** **Fixed phone :** +44 1372 381880	No	Yes
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4014	No	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	No
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Billy, Nicolas	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 30 77 54 64	No	Yes
Boumendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	No
Cao, Aijun	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 477 0806	No	Yes
Chapman, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks S.p.A.	**Mobile :** **Fixed phone :** +46 10 716 5436	Yes	Yes
Chen, Dong	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +86 10 5822 3008	No	Yes
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Czerepinski, Przemyslaw	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44 7917 087114	Yes	Yes
Das, Arnab	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1 732 949 8595	Yes	Yes
Drewes, Christian	Attendee	INFINEON TECHNOLOGIES	INFINEON TECHNOLOGIES	**Mobile :** **Fixed phone :** +49 89 234 84227	No	No
Du, Gaoke	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86 755 654 0223	Yes	Yes
Duan, Jinsong	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81 50 3687 6575	Yes	Yes
Dubuc, Christian	Attendee	Nortel Networks (USA)	Nortel Networks (USA)	**Mobile :** **Fixed phone :** +1 613-765-6726	No	Yes
Ebert, Pamela	Attendee	Vodafone GmbH	Vodafone GmbH	**Mobile :** +49 17 22 10 08 26 **Fixed phone :** +49 211 533 5289	No	Yes
Esmailzadeh, Riaz	Attendee	Keio University	Keio University	**Mobile :** **Fixed phone :** +81-45-563-1151	No	No
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fujimoto, Hisao	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81337981090	No	No
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co.	MELCO MOBILE COMMUNICATIONS	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes
Gerstenberger, Dirk	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes

Ghosh, Amitabha	Attendee	Motorola Inc	Motorola Inc.	**Mobile :** **Fixed phone :** +18476324121	No	Yes
Griguer, Marc	Attendee	ORANGE SA	ORANGE SA	**Mobile :** **Fixed phone :** +33 1 45 29 55 42	No	Yes
Guan, Hao	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +86 10 65392828	No	Yes
Harrison, Mark	Attendee	Motorola Inc.	Motorola Inc.	**Mobile :** **Fixed phone :**	No	Yes
Higa, Yoshito	Attendee	TEXAS Instruments Japan Ltd	TEXAS Instruments Japan Ltd	**Mobile :** **Fixed phone :** +81 3 4331 2026	No	Yes
Hindelang, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** +49 170 318 2770 **Fixed phone :** +49 89 636 73333	Yes	Yes
Hiroaki, Adachi	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81-3-3798-1090	No	No
Hoeynck, Andreas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +493038623054	No	Yes
Huang, Howard	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1-732-888-7187	No	Yes
Hwang, Seung-Hoon	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 31 450 2945	Yes	No
Ibrahim, Nicolas	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 97 61	No	Yes
Iochi, Hitoshi	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 468 40 5329	No	Yes
Javaudin, Jean-philippe	Attendee	France Telecom	France Telecom	**Mobile :** **Fixed phone :** +33 2 99 12 45 95	Yes	Yes
Kahtava, Jussi	Attendee	Nokia Japan Co. Ltd	Nokia Japan Co. Ltd	**Mobile :** **Fixed phone :** +447768237616	Yes	Yes
Kaipainen, Yrjö	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358504836514	Yes	No
Kawasaki, Yoshihiro	Attendee	FUJITSU Laboratories of Europe	FUJITSU Laboratories of Europe	**Mobile :** **Fixed phone :** +	No	Yes
Kim, Hojin	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 280 8192	No	Yes
Kim, Bong Hoe	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 343 450 4131	No	Yes
Klerer, Mark	Attendee	Flarion Technologies	Flarion Technologies	**Mobile :** **Fixed phone :** +1 908 443 8092	Yes	Yes
Kwak, Yongjun	Attendee	Samsung R&D Institute UK	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5112	No	Yes
Le Strat, Evelyne	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33 6 64 04 39 63 **Fixed phone :** +33139445339	No	Yes
Lee, Hyeon Woo	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** +82 10 9530 5120 **Fixed phone :** +82 31 279 5120	No	Yes
Lee, Juho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5115	No	Yes
Li, Xiaoqiang	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86 10 59253333	Yes	Yes
Liu, Jung-Tao	Attendee	Lucent Technologies	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1 408 735 8126	Yes	Yes
Ljung, Rickard	Attendee	TeliaSonera AB	TeliaSonera AB	**Mobile :** **Fixed phone :**	No	Yes
Love, Robert	Attendee	Motorola Inc	Motorola Solutions Denmark A/S	**Mobile :** **Fixed phone :** +1 847 523 3702	No	Yes
Makihira, Tsuneichi	Attendee	Mitsubishi Electric Co	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81 6 6495 6599	No	No
Malm, Peter	Attendee	Telefon AB LM Ericsson	Ericsson Japan K.K.	**Mobile :** **Fixed phone :** +46 46 194882	No	Yes
Matsuo, Hidenori	Attendee	Panasonic Mobile Comm	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 46 840 5710	No	Yes
Michel, Jürgen	Attendee	Nokia Siemens Networks	Nokia Siemens Networks S.p.A.	**Mobile :** **Fixed phone :** +49 89 722 49911	No	Yes
Mitra, Diptendu	Attendee	NOKIA UK Ltd	NOKIA UK Ltd	**Mobile :** **Fixed phone :** +441372381812	No	Yes
Mitsutake, Yuichiro	Attendee	SOFTBANK MOBILE Corp.	SOFTBANK MOBILE Corp.	**Mobile :** **Fixed phone :** +03-6403-1039	No	Yes
				Mobile :		

Miyazaki, Shunji	Attendee	Fujitsu Limited	Fujitsu Limited	**Mobile :** **Fixed phone :** +81-46-839-5374	No	Yes
Moulsley, Tim	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** +44 (0)7749073450 **Fixed phone :** +44 20 8 560 286	Yes	Yes
Murata, Jun	Attendee	SOFTBANK MOBILE Corp.	SOFTBANK MOBILE Corp.	**Mobile :** **Fixed phone :** +81 3 6403 1039	No	No
Murphy, Mark	Attendee	TTPCom Ltd	TTPCom Ltd	**Mobile :** **Fixed phone :** +44 1763 266266	Yes	Yes
Naka, Katsuyoshi	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 468 40 5407	Yes	Yes
Nguyen, Phong	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +61 3 9271 4589	Yes	Yes
Nishio, Akihiko	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 46 840 5694	No	Yes
Niwano, Kazuhito	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81468 47 6013	No	Yes
Nurse, Peter	Attendee	Alcatel-Lucent Nederland B.V.	Flarion Technologies	**Mobile :** **Fixed phone :** +1 403 242 3313	No	Yes
Obuchi, Kazuhisa	Attendee	Fujitsu Limited	Fujitsu Limited	**Mobile :** **Fixed phone :** +81 44 754 8648	Yes	No
Ode, Takayoshi	Attendee	Fujitsu Limited	Fujitsu Limited	**Mobile :** **Fixed phone :** +81-46-839-5370	No	Yes
Ogawa, Shinsuke	Attendee	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468 40 3530	No	Yes
Pace, Alessandro	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** +393356339765 **Fixed phone :** +390639009044	Yes	Yes
Park, Sang-Whan	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +44 1784 428 600	No	Yes
Park, Youngsoo	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279 5042	Yes	No
Parkvall, Stefan	Attendee	Ericsson AB	Ericsson Inc.	**Mobile :** **Fixed phone :** +46 70 2673452	Yes	Yes
Popovic, Branislav	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 4770813	No	Yes
Ranta-aho, Karri	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 521 0651	No	Yes
Roh, Dongwook	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 31 450 4131	No	Yes
Rudolf, Marian	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** +1-514-802-0579 **Fixed phone :** +1 514 904 4589	No	Yes
Sakai, Masashi	Attendee	Fujitsu Limited	Fujitsu Limited	**Mobile :** **Fixed phone :** +81 44 754 4142	Yes	No
Sasaki, Tsukasa	SECRETARY	Fujitsu Limited	ETSI	**Mobile :** **Fixed phone :** +81 46 839 5414	Yes	Yes
Sato, Masanori	Attendee	Sony Mobile Com. Japan, Inc.	Sony Mobile Com. Japan, Inc.	**Mobile :** **Fixed phone :** +81-3-5782-5199	No	Yes
Shim, Donghee	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-2-6100-2246	Yes	Yes
Spaling, Gerke	Attendee	Telefon A.B. LM Ericsson	Ericsson Korea	**Mobile :** **Fixed phone :** +31 53 4505 788	No	Yes
Steudle, Ville	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358718042588	Yes	Yes
Suzuki, Hidetoshi	Attendee	Panasonic Broadband Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 50 3686 7942	Yes	Yes
Takano, Nahoko	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81-45-939-2672	Yes	Yes
Takano, Michiaki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81-467-41-2885	No	Yes
Takeda, Yoshinobu	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81337981090	No	Yes
Tarkiainen, Markku	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 518 3406	No	Yes
Tatesh, Said	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** +44 7880 786679 **Fixed phone :** +44 1793 77 5093	Yes	Yes
Tomisato, Shigeru	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81-468-40-3553	No	Yes
[illegible]	[illegible]	[illegible]	[illegible]	**Mobile :**	[illegible]	[illegible]

Tong, Wen	Attendee	Nortel Networks (USA)	Nortel Networks (USA)	**Fixed phone :** +1 613 763 1315	No	No
Toskala, Antti	Chairman	NOKIA Corporation	NOKIA Corporation	**Mobile :** +358 40 513 2710 **Fixed phone :** +358 40 513 2710	Yes	Yes
Uehara, Toshiyuki	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81-46-840-5693	No	Yes
Umesh, Anil	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81 468403190	No	Yes
Usuda, Masafumi	ViceChairman	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468-40-3190	No	Yes
Van de beek, Jaap	Attendee	HUAWEI TECHNOLOGIES Co. Ltd.	HUAWEI TECHNOLOGIES Co. Ltd.	**Mobile :** **Fixed phone :** +468 4770808	No	Yes
Virtanen, Anu	Attendee	NOKIA MOBILE PHONES	NOKIA Corporation	**Mobile :** **Fixed phone :** +358-40-5060092	No	Yes
Vujcic, Dragan	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 47 85 41 38	Yes	Yes
Wakabayashi, Hideji	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +441256388812	Yes	Yes
Wang, Ting	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +86 10 68427711-2110	No	Yes
Wang, Ke	Attendee	CATT	CATT	**Mobile :** **Fixed phone :** +86 10 82029090	No	Yes
Whinnett, Nick	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +447715055535	Yes	Yes
Willenegger, Serge	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** +41 79 285 0241 **Fixed phone :** +41 24 436 3540	Yes	Yes
Yamada, Takefumi	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81-468-40-3551	No	Yes
Yamada, Toshio	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81 467 41 2860	No	No
Yamamoto, Hirohiko	Attendee	SHARP Corporation	SHARP Corporation	**Mobile :** **Fixed phone :** +81-43-299-8421	No	No
Yano, Tetsuya	Attendee	Fujitsu Limited	Fujitsu Limited	**Mobile :** **Fixed phone :** +81-46-839-5374	No	Yes
Yoshii, Isamu	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81-468-40-5449	Yes	Yes
Zhao, Zhuyan	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +86 10 65392828	No	Yes

EXHIBIT F

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1#32 **Identifier:** 22939

LIST OF REGISTERED ATTENDEES

View Listing | View Badges | Export to csv

Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Accame, Marco	Attendee	NEC Telecom MODUS Ltd.	NEC Telecom MODUS Ltd.	**Mobile :** **Fixed phone :** +44 1372 381880	No	Yes
Agin, Pascal	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 30 77 32 89	Yes	Yes
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	LG Electronics Inc	**Mobile :** **Fixed phone :** +82-31-450-4014	No	Yes
Baker, Matthew	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** **Fixed phone :** +44 7595 968709	Yes	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	No
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Beming, Per	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** +46 70 376 22 52 **Fixed phone :** +46 8 404 4681	Yes	Yes
Berens, Friedbert	Attendee	STMicroelectronics	STMicroelectronics	**Mobile :** +49 160 97971846 **Fixed phone :** +352 26714319	Yes	Yes
Boumendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	Yes
Braun, Volker	Attendee	Alcatel-Lucent	Alcatel-Lucent Deutschland AG	**Mobile :** **Fixed phone :** +49 711 821 40985	Yes	Yes
Cao, Aijun	Attendee	HuaWei Technologies Co., Ltd	CWTS	**Mobile :** **Fixed phone :** +46 8 477 0806	No	Yes
Chapman, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +46 10 716 5436	Yes	Yes
Charpentier, Frédéric	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +49 (0) 30 6686 1788	No	Yes
Chass, Amir	Attendee	Freescale Semiconductor Israel	Freescale Semiconductor Israel	**Mobile :** **Fixed phone :** +972 9 9522 718	No	Yes
Chen, Dong	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +86 10 5822 3008	No	No
Choi, Byoung-Jo	Attendee	LG Electronics Inc	LG Electronics Inc,	**Mobile :** +82 19 532 6031 **Fixed phone :** +82-31-450-7304	No	Yes
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Czerepinski, Przemyslaw	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44 7917 087114	Yes	Yes
Dahlman, Erik	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** +46 70 677 6705 **Fixed phone :** +46 8 764 13 77	No	Yes
De Benedittis, Rossella	Attendee	Nokia Siemens Networks S.p.A.	Nokia Siemens Networks S.p.A.	**Mobile :** **Fixed phone :**	Yes	No
Drewes, Christian	Attendee	INFINEON TECHNOLOGIES	INFINEON TECHNOLOGIES	**Mobile :** **Fixed phone :** +49 89 234 84227	No	No
Du, Gaoke	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +86 755 654 0223	Yes	Yes
Dubuc, Christian	Attendee	Nortel Networks (USA)	Nortel Networks (USA)	**Mobile :** **Fixed phone :** +1 613-765-6726	No	Yes

Ebert, Pamela	Attendee	Vodafone GmbH	Vodafone GmbH	**Mobile :** +49 17 22 10 08 26 **Fixed phone :** +49 211 533 5289	No	Yes
El Nahas, Hassan	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** **Fixed phone :** +33 1 39 44 56 02	No	No
Esculier, Carole	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33 6 64 04 58 90 **Fixed phone :**	No	No
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co.	MELCO MOBILE COMMUNICATIONS	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes
Gerlach, Christian G.	Attendee	Alcatel-Lucent Deutschland AG	Alcatel-Lucent Deutschland AG	**Mobile :** **Fixed phone :** +49.711.821-32200	Yes	Yes
Gerstenberger, Dirk	Chairman	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes
Ghosh, Amitabha	Attendee	Motorola Inc.	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +18476324121	No	Yes
Girard, Marie-Noëlle	Supp. Assist	ETSI	ETSI	**Mobile :** +33 (0)6 80 48 51 73 **Fixed phone :** +33 4 92 94 49 34	Yes	Yes
Göransson, Bo	Attendee	Telefon AB LM Ericsson	Ericsson Korea	**Mobile :** +46 730 311909 **Fixed phone :** +46 10 7170703	Yes	Yes
Griguer, Marc	Attendee	ORANGE SA	ORANGE SA	**Mobile :** **Fixed phone :** +33 1 45 29 55 42	No	Yes
Han, Jeonghoon	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5584	No	Yes
Harrison, Mark	Attendee	Motorola Inc.	Motorola Inc.	**Mobile :** **Fixed phone :**	No	Yes
Heo, Youn hyoung	Attendee	SAMSUNG Electronics Co., Ltd.	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5362	No	Yes
Hervouet, Guillaume	Attendee	ROHM Electronics GmbH	ROHM Electronics GmbH	**Mobile :** **Fixed phone :** +	Yes	Yes
Higa, Yoshito	Attendee	TEXAS Instruments Japan Ltd	TEXAS Instruments Japan Ltd	**Mobile :** **Fixed phone :** +81 3 4331 2026	No	Yes
Hindelang, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** +49 170 318 2770 **Fixed phone :** +49 89 636 73333	Yes	Yes
Hoeynck, Andreas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +493038623054	No	Yes
Horng, Henry	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +1 617 6217554	No	Yes
Hu, Teck	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +13214326159	Yes	Yes
Huang, Howard	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1-732-888-7187	No	Yes
Huang, Xuegang	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +861064721888-8460	No	Yes
Ibrahim, Nicolas	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 97 61	No	Yes
Iochi, Hitoshi	Attendee	Panasonic Mobile Comm	Panasonic Mobile Comm	**Mobile :** **Fixed phone :** +81 468 40 5329	No	Yes
Javaudin, Jean-philippe	Attendee	France Telecom	France Telecom	**Mobile :** **Fixed phone :** +33 2 99 12 45 95	Yes	Yes
Jensen, Dana	Attendee	MELCO MOBILE COMMUNICATIONS	MELCO MOBILE COMMUNICATIONS	**Mobile :** **Fixed phone :** +33 2 99 27 47 70	No	Yes
Kahtava, Jussi	Attendee	Nokia Japan Co. Ltd	Nokia Japan Co, Ltd	**Mobile :** **Fixed phone :** +447768237616	Yes	Yes
Kalpainen, Yrjö	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358504836514	Yes	Yes
Kanterakis, Emmanuel	Attendee	GOLDEN BRIDGE TECHNOLOGY INC.	GOLDEN BRIDGE TECHNOLOGY INC.	**Mobile :** **Fixed phone :** +1 732 870 8088	No	Yes
Kawasaki, Yoshiharo	Attendee	FUJITSU Laboratories of Europe	FUJITSU Laboratories of Europe	**Mobile :** **Fixed phone :** +	No	Yes
Kim, Youngbum	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5092	No	Yes
Kim, Hak-Seong	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** 82 11 9045 2055 **Fixed phone :** +82 31 450 4127	No	Yes
Kim, Sung-Jin	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 280 8175	No	Yes
				Mobile :		

Kim, Bong Hoe	Attendee	LG Electronics Inc	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 343 450 4131	No	Yes
Kistowski, Dirk	Attendee	Telekom Deutschland GmbH	Telekom Deutschland GmbH	**Mobile :** **Fixed phone :** +49 228 936 1 8419	Yes	Yes
Klerer, Mark	Attendee	Flarion Technologies	Flarion Technologies	**Mobile :** **Fixed phone :** +1 908 443 8092	Yes	Yes
Kwak, Yongjun	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +82 31 279 5112	No	Yes
Kyösti, Pekka	Attendee	Elektrobit Corporation	Elektrobit Corporation	**Mobile :** **Fixed phone :** +358 403442630	No	No
Le Pezennec, Yannick	Attendee	VODAFONE Group Plc	VODAFONE LTD	**Mobile :** +44 774 893 8886 **Fixed phone :** +34610518600	No	Yes
Le Strat, Evelyne	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33 6 64 04 39 63 **Fixed phone :** +33139445339	No	Yes
Lee, Sungho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5045	Yes	Yes
Lee, Juho	Attendee	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5115	No	Yes
Li, Xiaoqiang	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +86 10 59253333	Yes	Yes
Liu, Jung-Tao	Attendee	Lucent Technologies	Alcatel-Lucent	**Mobile :** **Fixed phone :** +1 408 735 8126	Yes	No
Ljung, Rickard	Attendee	TeliaSonera AB	TeliaSonera AB	**Mobile :** **Fixed phone :**	No	Yes
Love, Robert	Attendee	Motorola Inc.	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +1 847 523 3702	No	Yes
Malkamaki, Esa	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** +358 50 4836562 **Fixed phone :** +358 7180 36562	Yes	Yes
Malladi, Durga	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +1 858 651 2288	No	Yes
MALLECOT, Eric	Attendee	ROHM Electronics GmbH	ROHM Electronics GmbH	**Mobile :** **Fixed phone :**	No	Yes
Malm, Peter	Attendee	Telefon AB LM Ericsson	Ericsson Japan K.K.	**Mobile :** **Fixed phone :** +46 46 194882	No	Yes
Michel, Jürgen	Attendee	Nokia Siemens Networks	Nokia Siemens Networks S.p.A.	**Mobile :** **Fixed phone :** +49 89 722 49911	No	Yes
Mitra, Diptendu	Attendee	NOKIA UK Ltd	NOKIA UK Ltd	**Mobile :** **Fixed phone :** +441372381812	No	Yes
Murphy, Mark	Attendee	TTPCom Ltd	TTPCom Ltd	**Mobile :** **Fixed phone :** +44 1763 266266	Yes	Yes
Nishio, Akihiko	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 46 840 5694	No	Yes
Nurse, Peter	Attendee	Alcatel-Lucent Nederland B.V.	Flarion Technologies	**Mobile :** **Fixed phone :** +1 403 242 3313	No	Yes
Ogawa, Shinsuke	Attendee	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468 40 3530	No	Yes
Oh, Hyun seok	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5039	No	Yes
Pace, Alessandro	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** +393356339765 **Fixed phone :** +390639009044	Yes	No
Parkvall, Stefan	Attendee	Ericsson AB	Ericsson Inc.	**Mobile :** **Fixed phone :** +46 70 2673452	Yes	Yes
Politano, Christian	Attendee	STMicroelectronics	STMicroelectronics	**Mobile :** +33 6 80 21 34 49 **Fixed phone :** +41 22 929 5862	Yes	Yes
Popovic, Branislav	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 4770813	No	Yes
Pouessel, Damien	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 42 31	No	Yes
Ranta-aho, Karri	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 521 0651	No	Yes
Ring, Steffen	Attendee	Motorola Solutions Danmark A/S	Motorola Solutions Danmark A/S	**Mobile :** +45 4025 1881 **Fixed phone :** +45 4348 8362	Yes	No
Robion, Wilfrid	Attendee	BOUYGUES Telecom	BOUYGUES Telecom	**Mobile :** +33 6 60 31 63 53 **Fixed phone :** +33 1 41 09 51 32	No	Yes
Rudolf, Marian	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** +1-514-802-0579 **Fixed phone :** +1 514 904 4589	No	Yes
[illegible]	[illegible]	[illegible]	[illegible]	**Mobile :**	[illegible]	[illegible]

Sasaki, Tsukasa	SECRETARY	Fujitsu Limited	ETSI	**Fixed phone :** +81 46 839 5414	Yes	Yes
Sato, Masanori	Attendee	Sony Mobile Com. Japan Inc.	Sony Mobile Com. Japan, Inc.	**Mobile :** **Fixed phone :** +81-3-5782-5199	No	Yes
Savaglio, Frank	Attendee	NEC Corporation	NEC Corporation	**Mobile :** +46 761 498 311 **Fixed phone :** +46 10 715 4265.	Yes	Yes
Sehier, Philippe	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 01 30 77 18 94	Yes	Yes
Seo, Dongyoun	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-2931	Yes	Yes
Shim, Donghee	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-2-6100-2246	Yes	Yes
Soghomonian, Manook	Attendee	3	3	**Mobile :** +44 7782 325250 **Fixed phone :** +447920 870564	Yes	Yes
Spaling, Gerke	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +31 53 4505 788	No	Yes
Steudle, Ville	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358718042588	Yes	Yes
Stewart, Kenneth	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 847 877 5761 **Fixed phone :** +1 847 523 5761	Yes	Yes
Suzuki, Hidetoshi	Attendee	Panasonic Broadband Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 50 3686 7942	Yes	Yes
Taffin, Arnauld	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** **Fixed phone :** +33 1 39 30 86 53	Yes	Yes
Takano, Nahoko	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81-45-939-2672	Yes	Yes
Takano, Michiaki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81-467-41-2885	No	Yes
Tarkiainen, Markku	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 518 3406	No	Yes
Uehara, Toshiyuki	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81-46-840-5693	No	Yes
Umesh, Anil	Attendee	NTT DoCoMo	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468403190	No	Yes
Usuda, Masafumi	ViceChairman	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468-40-3190	No	Yes
Van de beek, Jaap	Attendee	HUAWEI TECHNOLOGIES Co. Ltd.	HUAWEI TECHNOLOGIES Co. Ltd.	**Mobile :** **Fixed phone :** +468 4770808	No	Yes
Vujcic, Dragan	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 47 85 41 38	Yes	Yes
Wakabayashi, Hideji	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +441256388812	Yes	Yes
Wang, Ting	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +86 10 68427711-2110	No	Yes
Whinnett, Nick	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +447715055535	Yes	Yes
Willenegger, Serge	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** +41 79 285 0241 **Fixed phone :** +41 24 436 3540	Yes	Yes
Won, Seung-Hwan	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** +82 19 9167 9901 **Fixed phone :** +82 31 450 4074	No	Yes
Wong, Eliza	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33130775698	No	Yes
Zelmer, Donald E.	Attendee	AT&T	AT&T	**Mobile :** +1 404 625-7008 **Fixed phone :** +1 404-499-6426	Yes	Yes

Any comments or problems with this application? Please let us know...

EXHIBIT G

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1#33 **Identifier:** 23136

LIST OF REGISTERED ATTENDEES

View Listing View Badges Export to csv

Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Accame, Marco	Attendee	NEC Telecom MODUS Ltd.	NEC Telecom MODUS Ltd.	**Mobile :** **Fixed phone :** +44 1372 381880	No	Yes
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	TTA	**Mobile :** **Fixed phone :** +82-31-450-4014	No	No
Baker, Matthew	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** **Fixed phone :** +44 7595 968709	Yes	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	Yes
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Billy, Nicolas	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 30 77 54 64	No	Yes
Bladsjo, David	Attendee	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** + 46 70 2673449 **Fixed phone :** +46 8 404 8657	No	No
Blenkin, Colin	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44 1794 833331	No	Yes
Boumendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	Yes
Braun, Volker	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +49 711 821 40985	Yes	Yes
Bui, Thanh	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +61 3 9271 4027	No	Yes
Chapman, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +46 10 716 5436	Yes	Yes
Charpentier, Frédéric	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +49 (0) 30 6686 1788	No	Yes
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Czerepinski, Przemyslaw	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44 7917 087114	Yes	Yes
Davidian, Jean-Jacques	Attendee	DoCoMo Europe S.A.	DoCoMo Europe S.A.	**Mobile :** **Fixed phone :** +33 1 5688 3030	Yes	Yes
De Benedittis, Rossella	Attendee	Nokia Siemens Networks S.p.A.	Nokia Siemens Networks S.p.A.	**Mobile :** **Fixed phone :**	Yes	No
De lind van wijngaarden, Adriaan	Attendee	Lucent Technologies	Lucent Technologies	**Mobile :** **Fixed phone :** +1-908-5823080	No	Yes
Dick, Steve	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1 6316224001	No	Yes
Dubuc, Christian	Attendee	Nortel Networks (USA)	Nortel Networks (USA)	**Mobile :** **Fixed phone :** +1 613-765-6726	No	Yes
El Nahas, Hassan	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** **Fixed phone :** +33 1 39 44 56 02	No	Yes
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes

Gerlach, Christian G.	Attendee	Alcatel-Lucent Deutschland AG	Alcatel-Lucent Deutschland AG	**Mobile :** **Fixed phone :** +49.711.821-32200	Yes	Yes
Gerstenberger, Dirk	Chairman	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes
Gha, Hee Don	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5046	No	Yes
Ghosh, Amitabha	Attendee	Motorola Inc	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +18476324121	No	Yes
Göransson, Bo	Attendee	Telefon AB LM Ericsson	Nanjing Ericsson Panda Com Ltd	**Mobile :** +46 730 311909 **Fixed phone :** +46 10 7170703	Yes	Yes
Griguer, Marc	Attendee	ORANGE SA	ORANGE SA	**Mobile :** **Fixed phone :** +33 1 45 29 55 42	No	Yes
Han, Jeonghoon	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5584	No	Yes
Harrison, Mark	Attendee	Motorola Inc	Freescale Semiconductor Israel	**Mobile :** **Fixed phone :**	No	Yes
Hassan Ul, Syed Rizwan	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +44 1784 428 600	No	Yes
He, Yusong	Attendee	CATT	CATT	**Mobile :** **Fixed phone :** +86 10 58832098	Yes	No
Heo, Youn hyoung	Attendee	SAMSUNG Electronics Co., Ltd.	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5362	No	Yes
Higa, Yoshito	Attendee	TEXAS Instruments Japan Ltd	TEXAS Instruments Japan Ltd	**Mobile :** **Fixed phone :** +81 3 4331 2026	No	Yes
Hindelang, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** +49 170 318 2770 **Fixed phone :** +49 89 636 73333	Yes	Yes
Hu, Teck	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +13214326159	Yes	Yes
Huang, Howard	Attendee	Alcatel-Lucent	Lucent Technologies	**Mobile :** **Fixed phone :** +1-732-888-7187	No	Yes
Huang, Xuegang	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +861064721888-8460	No	Yes
Ibrahim, Nicolas	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 97 61	No	Yes
Iochi, Hitoshi	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 468 40 5329	No	Yes
Javaudin, Jean-philippe	Attendee	France Telecom	France Telecom	**Mobile :** **Fixed phone :** +33 2 99 12 45 95	Yes	Yes
Kahtava, Jussi	Attendee	Nokia Japan Co, Ltd	Nokia Japan Co, Ltd	**Mobile :** **Fixed phone :** +447768237616	Yes	Yes
Kaipainen, Yrjö	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358504836514	Yes	No
Kanterakis, Emmanuel	Attendee	GOLDEN BRIDGE TECHNOLOGY INC.	GOLDEN BRIDGE TECHNOLOGY INC.	**Mobile :** **Fixed phone :** +1 732 870 8088	No	Yes
Kim, Bong Hoe	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 343 450 4131	No	Yes
Kim, Youngbum	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5092	No	Yes
Kim, Byoungyun	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5915	No	Yes
Kim, Sung-Jin	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 280 8175	No	Yes
Kim, Hak-Seong	Attendee	LG Electronics Inc.	TTA	**Mobile :** 82 11 9045 2055 **Fixed phone :** +82 31 450 4127	No	No
Kistowski, Dirk	Attendee	Telekom Deutschland GmbH	Telekom Deutschland GmbH	**Mobile :** **Fixed phone :** +49 228 936 1 8419	Yes	Yes
Klerer, Mark	Attendee	Flarion Technologies	Flarion Technologies	**Mobile :** **Fixed phone :** +1 908 443 8092	Yes	Yes
Kwak, Yongjun	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +82 31 279 5112	No	Yes
Le Pezennec, Yannick	Attendee	VODAFONE Group Plc	VODAFONE Group Plc	**Mobile :** +44 774 893 8886 **Fixed phone :** +34610518600	No	Yes
Le Strat, Evelyne	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33 6 64 04 39 63 **Fixed phone :** +33139445339	No	Yes
Lee, Sungho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5045	Yes	Yes
				Mobile :		

Lee, Juho	ViceChairman	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5115	No	Yes
Liu, Jung-Tao	Attendee	Lucent Technologies	Lucent Technologies	**Mobile :** **Fixed phone :** +1 408 735 8126	Yes	Yes
Ljung, Rickard	Attendee	TeliaSonera AB	TeliaSonera AB	**Mobile :** **Fixed phone :**	No	Yes
Löhr, Joachim	Attendee	PANASONIC R&D Center Germany	PANASONIC R&D Center Germany	**Mobile :** **Fixed phone :** +49 6103 766 263	No	Yes
Love, Robert	Attendee	Motorola Inc.	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +1 847 523 3702	No	Yes
Malladi, Durga	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +1 858 651 2288	No	Yes
Malm, Peter	Attendee	Telefon AB LM Ericsson	Ericsson Japan K.K.	**Mobile :** **Fixed phone :** +46 46 194882	No	Yes
Michel, Jürgen	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +49 89 722 49911	No	Yes
Mitra, Diptendu	Attendee	NOKIA UK Ltd	NOKIA UK Ltd	**Mobile :** **Fixed phone :** +441372381812	No	Yes
Molisch, Andreas	Attendee	AT&T Wireless Services, Inc.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +1 617 621 7558	No	No
Monogioudis, Pantelis	Attendee	Alcatel-Lucent	Lucent Technologies	**Mobile :** **Fixed phone :** +1 973 386 2238	Yes	Yes
Murphy, Mark	Attendee	TTPCom Ltd	TTPCom Ltd	**Mobile :** **Fixed phone :** +44 1763 266266	Yes	Yes
Nacson, Yosi	Attendee	Sandbridge Technologies Inc.	Sandbridge Technologies Inc.	**Mobile :** **Fixed phone :** +1 914 287-8525	No	Yes
Nagaraj, Shirish	Attendee	Lucent Technologies	Lucent Technologies	**Mobile :** **Fixed phone :** +1-973-386-7940	No	No
Ng, Man Hung	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** **Fixed phone :** +44 1793 775025	Yes	Yes
Nishio, Akihiko	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 46 840 5694	No	Yes
Nurse, Peter	Attendee	Waiting for new Company	Flarion Technologies	**Mobile :** **Fixed phone :** +1 403 242 3313	No	Yes
O'Brien, Fran	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** +1 201 572 5636 **Fixed phone :** +1 908 582 0867	Yes	Yes
Ogawa, Shinsuke	Attendee	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468 40 3530	No	Yes
Oh, Hyun seok	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82-31-279-5039	No	Yes
Pace, Alessandro	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** +393356339765 **Fixed phone :** +390639009044	Yes	Yes
Parkvall, Stefan	Attendee	Ericsson AB	Ericsson Inc.	**Mobile :** **Fixed phone :** +46 70 2673452	Yes	Yes
Popovic, Branislav	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 4770813	No	Yes
Ranta-aho, Karri	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 521 0651	No	Yes
Robion, Wilfrid	Attendee	BOUYGUES Telecom	BOUYGUES Telecom	**Mobile :** +33 6 60 31 63 53 **Fixed phone :** +33 1 41 09 51 32	No	Yes
Rudolf, Marian	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** +1-514-802-0579 **Fixed phone :** +1 514 904 4589	No	Yes
Sasaki, Tsukasa	SECRETARY	Fujitsu Limited	ETSI	**Mobile :** **Fixed phone :** +81 46 839 5414	Yes	Yes
Sato, Masanori	Attendee	Sony Mobile Com. Japan, Inc.	Sony Mobile Com. Japan, Inc.	**Mobile :** **Fixed phone :** +81-3-5782-5199	No	Yes
Schmidl, Tim	Attendee	TEXAS Instruments	TEXAS Instruments	**Mobile :** **Fixed phone :** +1 214 480 4460	No	No
Seo, Dongyoun	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-2931	Yes	Yes
Sharma, Naresh	Attendee	Alcatel-Lucent	Lucent Technologies	**Mobile :** **Fixed phone :** +1-973-428-7648	No	Yes
Shin, Sung-Hyuk	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1-631-622-4043	No	Yes
Sternberg, Greg	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1 631 622 4103	No	No
				Mobile :		

Steudle, Ville	Attendee	NOKIA Corporation	NOKIA Corporation	**Fixed phone :** +358718042588	Yes	Yes
Stewart, Kenneth	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 847 877 5761 **Fixed phone :** +1 847 523 5761	Yes	No
Suzuki, Hidetoshi	Attendee	Panasonic Broadband Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 50 3686 7942	Yes	Yes
Takano, Nahoko	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81-45-939-2672	Yes	Yes
Takano, Michiaki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81-467-41-2885	No	Yes
Tarkiainen, Markku	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 518 3406	No	Yes
Tatesh, Ssid	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** +44 7880 786679 **Fixed phone :** +44 1793 77 5093	Yes	Yes
Umesh, Anil	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81 468403190	No	Yes
Van de beek, Jaap	Attendee	HUAWEI TECHNOLOGIES Co. Ltd.	HUAWEI TECHNOLOGIES Co. Ltd.	**Mobile :** **Fixed phone :** +468 4770808	No	Yes
Virtanen, Anu	Attendee	NOKIA MOBILE PHONES	NOKIA Corporation	**Mobile :** **Fixed phone :** +358-40-5060092	No	Yes
Vujcic, Dragan	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 47 85 41 38	Yes	Yes
Wakabayashi, Hideji	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +441256388812	Yes	Yes
Wang, Yuhong	Attendee	Institute for Infocomm Researc	STMicroelectronics	**Mobile :** **Fixed phone :**	No	Yes
Wang, Ting	Attendee	Samsung R&D Institute UK	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +86 10 68427711-2110	No	Yes
Wang, Ke	Attendee	CATT	CATT	**Mobile :** **Fixed phone :** +86 10 82029090	No	Yes
Willenegger, Serge	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** +41 79 285 0241 **Fixed phone :** +41 24 436 3540	Yes	Yes
Won, Seung-Hwan	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** +82 19 9167 9901 **Fixed phone :** +82 31 450 4074	No	Yes
Zelmer, Donald E.	Attendee	AT&T	AT&T	**Mobile :** +1 404 625-7008 **Fixed phone :** +1 404-499-6426	Yes	Yes
Zhang, Xiaoxia	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +001 858-6585035	No	Yes
Zhang, Yujian	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +8613511008996	Yes	Yes

Any comments or problems with this application? Please let us know...

EXHIBIT H

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1#34 **Identifier:** 23137

LIST OF REGISTERED ATTENDEES

View Listing View Badges Export to csv

Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4014	No	Yes
Bader, Uwe	Attendee	ROHDE & SCHWARZ	ROHDE & SCHWARZ	**Mobile :** **Fixed phone :**	No	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	Yes
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Billy, Nicolas	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 30 77 54 64	No	Yes
Boumendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	Yes
Braun, Volker	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +49 711 821 40985	Yes	Yes
Bui, Thanh	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +61 3 9271 4027	No	Yes
Chapman, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +46 10 716 5436	Yes	Yes
Chen, Dong	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +86 10 5822 3008	No	Yes
Cho, Yunok	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5899	No	Yes
Choi, Byoung-Jo	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** +82 19 532 6031 **Fixed phone :** +82-31-450-7304	No	No
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Czerepinski, Przemyslaw	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44 7917 087114	Yes	Yes
Dubuc, Christian	Attendee	Nortel Networks (USA)	Nortel Networks (USA)	**Mobile :** **Fixed phone :** +1 613-765-6726	No	Yes
El Nahas, Hassan	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** **Fixed phone :** +33 1 39 44 56 02	No	Yes
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd.	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes
Gerstenberger, Dirk	Chairman	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes
Ghosh, Amitabha	Attendee	Motorola Inc.	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +18476324121	No	Yes
Göransson, Bo	Attendee	Telefon AB LM Ericsson	Ericsson Korea	**Mobile :** +46 730 311909 **Fixed phone :** +46 10 7170703	Yes	Yes
Han, Jeonghoon	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5584	No	Yes
Harrison, Mark	Attendee	Motorola Inc.	Freescale Semiconductor Israel	**Mobile :** **Fixed phone :**	No	Yes

Hassan Ul, Syed Rizwan	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +44 1784 428 600	No	Yes
Hee Don, Gha	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5046	No	Yes
Heo, Youn hyoung	Attendee	SAMSUNG Electronics Co., Ltd.	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5362	No	Yes
Higa, Yoshito	Attendee	TEXAS Instruments Japan Ltd	TEXAS Instruments Japan Ltd	**Mobile :** **Fixed phone :** +81 3 4331 2026	No	Yes
Hindelang, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** +49 170 318 2770 **Fixed phone :** +49 89 636 73333	Yes	Yes
Hu, Teck	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +13214326159	Yes	Yes
Hwang, Bong-jun	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4133	No	No
Ibrahim, Nicolas	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 97 61	No	Yes
Iochi, Hitoshi	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 468 40 5329	No	Yes
Javaudin, Jean-philippe	Attendee	France Telecom	France Telecom	**Mobile :** **Fixed phone :** +33 2 99 12 45 95	Yes	Yes
Jeong, Hooyoung	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-2942	No	No
Jeong, Byung-jang		Not Found	Not Found	**Mobile :** **Fixed phone :** +82-42-860-6765	No	N/A
Kaipainen, Yrjö	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358504836514	Yes	Yes
Kim, Bong Hoe	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 343 450 4131	No	Yes
Kim, Sung-Jin	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 280 8175	No	Yes
Kim, Byoungyun	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5915	No	Yes
Kim, Song hun	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5118	No	Yes
Kim, Jaeheung		Not Found	Not Found	**Mobile :** **Fixed phone :** +82-42-860-6806	No	N/A
Kim, Sung yoon	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-2-2005-2786	No	No
Kim, Wooseob	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-2-2005-2787	No	No
Kim, Jaeheung	Attendee	ETRI	ETRI	**Mobile :** **Fixed phone :** +82-42-860-6806	No	Yes
Kim, Youngbum	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5092	No	Yes
Kim, Hak-Seong	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** 82 11 9045 2055 **Fixed phone :** +82 31 450 4127	No	Yes
Kim, Hong-jik	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +81-31-450-2942	No	No
Kim, Sung Yoon	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 2 2005 2786	No	Yes
Kim, WooSeob	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-1908	Yes	Yes
Klerer, Mark	Attendee	Flarion Technologies	Flarion Technologies	**Mobile :** **Fixed phone :** +1 908 443 8092	Yes	No
Koo, Hyounhee	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-2-2033-7269	Yes	Yes
Kwak, Yongjun	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +82 31 279 5112	No	Yes
Kwon, Jaekyun	Attendee	ETRI	ETRI	**Mobile :** **Fixed phone :** +82 42 860 6759	No	Yes
Kwon, Sung Lark	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4162	No	No
Kwon, Hyuck Chan	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-7304	No	No
Le Pezennec, Yannick	Attendee	VODAFONE Group Plc	VODAFONE Group Plc	**Mobile :** +44 774 893 8886 **Fixed phone :** +34610518600	No	Yes
				Mobile : +33 6 64 04 39 63		

Le Strat, Evelyne	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** [illegible] **Fixed phone :** +33139445339	No	Yes
Lee, Sungho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5045	Yes	Yes
Lee, Juho	ViceChairman	Samsung R&D Institute UK	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82 31 279 5115	No	Yes
Lee, Hyejeong	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5912	No	Yes
Lee, Junwon	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5107	No	Yes
Lee, Kyung sup	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-2903	No	No
Lee, Jinsock	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81 443962575	Yes	Yes
Ljung, Rickard	Attendee	TeliaSonera AB	TeliaSonera AB	**Mobile :** **Fixed phone :**	No	Yes
Löhr, Joachim	Attendee	PANASONIC R&D Center Germany	PANASONIC R&D Center Germany	**Mobile :** **Fixed phone :** +49 6103 766 263	No	Yes
Love, Robert	Attendee	Motorola Inc.	Motorola Solutions UK Ltd.	**Mobile :** **Fixed phone :** +1 847 523 3702	No	Yes
Michel, Jürgen	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +49 89 722 49911	No	Yes
Mitra, Diptendu	Attendee	NOKIA UK Ltd	NOKIA UK Ltd	**Mobile :** **Fixed phone :** +441372381812	No	Yes
Moulsley, Tim	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** +44 (0)7749073450 **Fixed phone :** +44 20 8 560 286	Yes	Yes
Murphy, Mark	Attendee	TTPCom Ltd	TTPCom Ltd	**Mobile :** **Fixed phone :** +44 1763 266266	Yes	Yes
Ng, Man Hung	Attendee	Alcatel-Lucent Telecom Ltd	Alcatel-Lucent Telecom Ltd	**Mobile :** **Fixed phone :** +44 1793 775025	Yes	Yes
Nurse, Peter	Attendee	Sigma Delta Communications	Flarion Technologies	**Mobile :** **Fixed phone :** +1 403 242 3313	No	Yes
Ogawa, Shinsuke	Attendee	NTT DOCOMO INC.	NTT DOCOMO INC.	**Mobile :** **Fixed phone :** +81 468 40 3530	No	Yes
Oh, Hyun seok	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5039	No	Yes
Pace, Alessandro	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** +393356339765 **Fixed phone :** +390639009044	Yes	Yes
Paik, Kyung Hyun	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5534	No	Yes
Paik, Kyung hyun	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5534	No	No
Park, Byoung seong	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4133	No	Yes
Park, Hee gul	Attendee	LG TeleCom	LG Electronics Inc.	**Mobile :** **Fixed phone :** +88-31-450-2908	No	Yes
Parkvall, Stefan	Attendee	Ericsson AB	Ericsson Inc.	**Mobile :** **Fixed phone :** +46 70 2673452	Yes	Yes
Popovic, Branislav	Attendee	HuaWei Technologies Co., Ltd	HuaWei Technologies Co., Ltd	**Mobile :** **Fixed phone :** +46 8 4770813	No	Yes
Ranta-aho, Karri	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 521 0651	No	Yes
Roh, Dongwook	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 31 450 4131	No	Yes
Rudolf, Marian	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** +1-514-802-0579 **Fixed phone :** +1 514 904 4589	No	Yes
Ryu, YoungKwon	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4135	No	Yes
Sasaki, Tsukasa	SECRETARY	Fujitsu Limited	ETSI	**Mobile :** **Fixed phone :** +81 46 839 5414	Yes	Yes
Sato, Masanori	Attendee	Sony Mobile Com. Japan, Inc.	Sony Mobile Com. Japan, Inc.	**Mobile :** **Fixed phone :** +81-3-5782-5199	No	No
Seo, Dongyoun	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-2931	Yes	Yes
Shin, Sung-Hyuk	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1-631-622-4043	No	Yes
[illegible]	[illegible]	[illegible]	[illegible]	**Mobile :**	[illegible]	[illegible]

Shin, Sung nyuk	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Fixed phone :** +1-631-622-4043	No	No
Soghomonian, Manook	Attendee	3	3	**Mobile :** +44 7782 325250 **Fixed phone :** +447920 870564	Yes	Yes
Song, Hoon-geun	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +	No	Yes
Steudle, Ville	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358718042588	Yes	Yes
Suzuki, Hidetoshi	Attendee	Panasonic Broadband Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 50 3686 7942	Yes	Yes
Tarkiainen, Markku	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358 50 518 3406	No	Yes
Umesh, Anil	Attendee	NTT DoCoMo	NTT DoCoMo	**Mobile :** **Fixed phone :** +81 468403190	No	Yes
Van de beek, Jaap	Attendee	HUAWEI TECHNOLOGIES Co. Ltd.	HUAWEI TECHNOLOGIES Co. Ltd.	**Mobile :** **Fixed phone :** +468 4770808	No	Yes
Virtanen, Anu	Attendee	NOKIA MOBILE PHONES	NOKIA Corporation	**Mobile :** **Fixed phone :** +358-40-5060092	No	Yes
Vujcic, Dragan	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 47 85 41 38	Yes	Yes
Wakabayashi, Hideji	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +441256388812	Yes	Yes
Wang, Ke	Attendee	CATT	CATT	**Mobile :** **Fixed phone :** +86 10 82029090	No	No
Willenegger, Serge	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** +41 79 285 0241 **Fixed phone :** +41 24 436 3540	Yes	Yes
Won, Seung-Hwan	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** +82 19 9167 9901 **Fixed phone :** +82 31 450 4074	No	Yes
Yeo, Kunmin		Not Found	Not Found	**Mobile :** **Fixed phone :** +82-42-860-5438	No	N/A
Yeo, Kunmin	Attendee	ETRI	ETRI	**Mobile :** **Fixed phone :** +82-42-860-5438	Yes	Yes
Yoon, Jung wook	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +	No	Yes
Yoon, Sujin	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5914	No	Yes
Yu, Kyungmo	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-2908	No	No
Yu, Hyunseok	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5971	No	Yes
Yuk, Youngsoo	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-7808	Yes	No
Zelmer, Donald E.	Attendee	AT&T	AT&T	**Mobile :** +1 404 625-7008 **Fixed phone :** +1 404-499-6426	Yes	Yes
Zhang, Yujian	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +8613511008996	Yes	Yes

Any comments or problems with this application? Please let us know...

EXHIBIT I

3GPP Meeting Registration

2013-02-20 Version 1.2

Meeting: 3GPPRAN1#35 **Identifier:** 23138

LIST OF REGISTERED ATTENDEES

View Listing | View Badges | Export to csv

Name	Role	Organization	Organization Represented	Mobile/Fixed phone	EOL Account	Attended
Ahn, Joon-Kui	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82-31-450-4014	No	Yes
Baker, Matthew	Attendee	Philips Research Labs	PHILIPS Semiconductors	**Mobile :** **Fixed phone :** +44 7595 968709	Yes	Yes
Bartlett, David	Attendee	Cambridge Positioning Systems	Cambridge Positioning Systems	**Mobile :** **Fixed phone :**	No	Yes
Beale, Martin	Attendee	General Dynamics Broadband UK	General Dynamics Broadband UK	**Mobile :** **Fixed phone :** +44 1249 800022	Yes	Yes
Billy, Nicolas	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +33 1 30 77 54 64	No	Yes
Boumendil, Sarah	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33(0)140761475 **Fixed phone :** +33 (0)664043282	Yes	Yes
Braun, Volker	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +49 711 821 40985	Yes	Yes
Bui, Thanh	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +61 3 9271 4027	No	Yes
Buracchini, Enrico	Attendee	TELECOM ITALIA S.p.A.	TELECOM ITALIA S.p.A.	**Mobile :** **Fixed phone :** +390112287118	Yes	Yes
Charpentier, Frédéric	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +49 (0) 30 6686 1788	No	Yes
Czapla, Liliana	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +17183350729	No	Yes
Czerepinski, Przemyslaw	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +44 7917 087114	Yes	Yes
Dahlman, Erik	Attendee	Telefon AB LM Ericsson	Nanjing Ericsson Panda Com Ltd	**Mobile :** +46 70 677 6705 **Fixed phone :** +46 8 764 13 77	No	Yes
Damnjanovic, Jelena	Attendee	QUALCOMM CDMA Technologies	QUALCOMM CDMA Technologies	**Mobile :** **Fixed phone :** +1 858 6515387	No	Yes
Dick, Steve	Attendee	INTERDIGITAL COMMUNICATIONS	INTERDIGITAL COMMUNICATIONS	**Mobile :** **Fixed phone :** +1 6316224001	No	Yes
Duan, Jinsong	Attendee	Panasonic Mobile Communication	Panasonic Mobile Comm	**Mobile :** **Fixed phone :** +81 50 3687 6575	Yes	Yes
Dubuc, Christian	Attendee	Nortel Networks (USA)	Nortel Networks (USA)	**Mobile :** **Fixed phone :** +1 613-765-6726	No	Yes
El Nahas, Hassan	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** **Fixed phone :** +33 1 39 44 56 02	No	Yes
Fabien, Jean-Aicard	Attendee	Motorola Solutions UK Ltd.	Motorola Solutions UK Ltd	**Mobile :** +1 224 619 4858 **Fixed phone :** +1 224 619 4858	Yes	Yes
Fukui, Noriyuki	Attendee	Mitsubishi Electric Co.	Mitsubishi Electric Co.	**Mobile :** **Fixed phone :** +81 467 41 2454	No	Yes
Gerlach, Christian G.	Attendee	Alcatel-Lucent Deutschland AG	Alcatel-Lucent	**Mobile :** **Fixed phone :** +49.711.821-32200	Yes	Yes
Gerstenberger, Dirk	Chairman	Telefon AB LM Ericsson	Telefon AB LM Ericsson	**Mobile :** **Fixed phone :** +46 10 71 33901	Yes	Yes
Ghosh, Amitabha	Attendee	Motorola Inc.	Motorola Solutions UK Ltd	**Mobile :** **Fixed phone :** +18476324121	No	Yes

Grant, Marc	Attendee	AT&T	AT&T	**Mobile :** +1 512 483 1190 **Fixed phone :** +1 512 483 1190	Yes	No
Griguer, Marc	Attendee	ORANGE SA	ORANGE SA	**Mobile :** **Fixed phone :** +33 1 45 29 55 42	No	Yes
Harnson, Mark	Attendee	Motorola Inc.	Freescale Semiconductor Israel	**Mobile :** **Fixed phone :**	No	Yes
Hassan Ul, Syed Rizwan	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +44 1784 428 600	No	No
Heo, Youn hyoung	Attendee	SAMSUNG Electronics Co., Ltd.	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +82 31 279 5362	No	Yes
Higa, Yoshito	Attendee	TEXAS Instruments Japan Ltd	TEXAS Instruments Japan Ltd	**Mobile :** **Fixed phone :** +81 3 4331 2026	No	Yes
Hindelang, Thomas	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** +49 170 318 2770 **Fixed phone :** +49 89 636 73333	Yes	Yes
Hu, Teck	Attendee	Alcatel-Lucent	Alcatel-Lucent	**Mobile :** **Fixed phone :** +13214326159	Yes	Yes
Huang, Howard	Attendee	Alcatel-Lucent	Alcatel-Lucent Telecom Ltd	**Mobile :** **Fixed phone :** +1-732-888-7187	No	Yes
Huang, Xuegang	Attendee	Nokia Siemens Networks	Nokia Siemens Networks	**Mobile :** **Fixed phone :** +861064721888-8460	No	Yes
Ibrahim, Nicolas	Attendee	WAVECOM	WAVECOM	**Mobile :** **Fixed phone :** +33 1 46 29 97 61	No	Yes
Iochi, Hitoshi	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 468 40 5329	No	Yes
Javaudin, Jean-philippe	Attendee	France Telecom	France Telecom	**Mobile :** **Fixed phone :** +33 2 99 12 45 95	Yes	Yes
Kalpainen, Yrjö	Attendee	NOKIA Corporation	NOKIA Corporation	**Mobile :** **Fixed phone :** +358504836514	Yes	Yes
Kasahara, Toshihiro	Attendee	Panasonic Mobile Comm.	Panasonic Mobile Comm.	**Mobile :** **Fixed phone :** +81 45 938 2839	No	Yes
Kim, Hak-Seong	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** 82 11 9045 2055 **Fixed phone :** +82 31 450 4127	No	Yes
Kim, Youngbum	Attendee	Samsung Electronics Co., Ltd	SAMSUNG Electronics Co., Ltd.	**Mobile :** **Fixed phone :** +82 31 279 5092	No	Yes
Kim, Bong Hoe	Attendee	LG Electronics Inc.	LG Electronics Inc.	**Mobile :** **Fixed phone :** +82 343 450 4131	No	Yes
Kim, Song hun	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5118	No	Yes
Kim, Sung jin	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-280-8175	No	Yes
Kistowski, Dirk	Attendee	Telekom Deutschland GmbH	Telekom Deutschland GmbH	**Mobile :** **Fixed phone :** +49 228 936 1 8419	Yes	Yes
Klerer, Mark	Attendee	Flarion Technologies	Flarion Technologies	**Mobile :** **Fixed phone :** +1 908 443 8092	Yes	Yes
Kwak, Yongjun	Attendee	Samsung R&D Institute UK	Samsung R&D Institute UK	**Mobile :** **Fixed phone :** +82 31 279 5112	No	Yes
Le Pezennec, Yannick	Attendee	VODAFONE Group Plc	VODAFONE Group Plc	**Mobile :** +44 774 893 8886 **Fixed phone :** +34610518600	No	Yes
Le Strat, Evelyne	Attendee	GENBAND TELECOMMUNICATIONS	GENBAND TELECOMMUNICATIONS	**Mobile :** +33 6 64 04 39 63 **Fixed phone :** +33139445339	No	Yes
Lee, Jinsock	Attendee	NEC Corporation	NEC Corporation	**Mobile :** **Fixed phone :** +81 443962575	Yes	Yes
Lee, Sungho	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5045	Yes	Yes
Lee, Junwon	Attendee	Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd	**Mobile :** **Fixed phone :** +82-31-279-5107	No	Yes
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Any comments or problems with this application? Please let us know...

EXHIBIT J

TSG-RAN WG1 #28bis meeting
Espoo, Finland
October 8th – 9th, 2002

Tdoc R1-02-1219

Agenda item: Uplink enhancements for Dedicated Transport Channels

Source: Nokia

Title: Issues to be studied for Enhanced Uplink DCH

Document for: Discussion and decision

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1. INTRODUCTION

In the RAN #17 meeting , a release 6 study item with the title "Uplink enhancements for Dedicated Transport channels" [1] was approved. In this paper the study areas listed in the study item sheet are gone through, along with discussing what kind of issues could be included into the study areas for each topic.

2. JUSTIFICATION AND OBJECTIVES

The main targets, listed in the agreed study item sheet, were to improve both the coverage and throughput , as well as reduce the delay of the uplink. To accomplish these targets, it was agreed that the study should include, but not be restricted to, the following topics related to enhanced uplink for UTRA FDD to enhance uplink performance in general or to enhance the uplink performance for background, interactive and streaming based traffic:

- Adaptive modulation and coding schemes
- Hybrid ARQ protocols
- Node B controlled scheduling
- Physical layer or higher layer signalling mechanisms to support the enhancements
- Fast DCH setup
- Shorter frame size and improved QoS

Areas that could be studied under these topics are discussed further in the next section.

3. STUDY AREAS

3.1 Scheduling

NodeB controlled scheduling with AMC

Method: One possible approach how to introduce possible enhancements in uplink, would be to copy the concept of HSDPA to uplink. This would mean that the transport format, in terms of SF, modulation and coding – i.e. TFRC, would be changed in the channel fading rate. This would probably need the modification of the TTI size to be smaller than 10ms, to make it work properly without power control or with some slower power control cycle. Also there would probably need to be some kind of signaling between UE and NodeB to allow the scheduling at the network side to have a clear control of the TFRC, allocated to the UE. Thus UE would need to give some indication to the network , what kind of bit rate is needed by the UE. And network side would need to signal some feedback to the UE what TFRC is allowed.

Targets: One of the targets in this approach would be to allow very high bit rates close to the cell, in a similar way as in HSDPA. The other target would be to minimise the variance of the uplink noise rise in the own cell by fast NodeB scheduling.

Potential benefit: If the uplink noise rise variance can be minimised with the above mentioned techniques, this method could potentially result in the increase in uplink throughput, due to smaller power margin requirement for combatting the overload conditions.

NodeB controlled scheduling with closed loop power control

Method: Another possible approach how to introduce the enhancements in uplink would be to use the current closed loop power control cycle in uplink, and mainly concentrate on fast packet scheduling at the NodeB.

If we take the rel99 uplink packet scheduling as a reference, there the possible techniques are traffic volume measurements coupled with UL TFCS management, and TFC selection at the UE. The idea in these are that that the network side gives some parameters to the UE for traffic volume measurements purposes, i.e. how the UE can inform to the network about its current buffer status , by means of RRC signaling. E.g. there could be some threshold given by the network, so that if the UE's buffer contents exceeds the threshold, the UE sends traffic volume measurement to the network, simultaneously informing how much data there is currently in its buffer. Another alternative is to have periodic traffic volume measurements , reported by the UE to the network. In return, the network can inform the currently allowed uplink TFCS set to the UE. With the allocated TFCS given by the network, UE can decide , according to the TFC selection procedure defined in [2,3], what TFC among the TFCS it uses, depending how much data it has in its buffer to be transmitted, and whether current level of the transmitter power allows the UE to transmit with the corresponding TFC.

One possible drawback in the current Rel99 uplink scheduling techniques, is the fact that they implicitly mean quite statistical packet scheduling approach at the RNC. Statistical packet scheduling in this context means, that if the traffic created in different UEs is quite bursty, and if RNC has still given the UE relatively high data rate in the allowed UL TFCS, it cannot be guaranteed that the activity periods in different UEs will result in a smoothed average UL noise rise. Instead there will be peaks in the uplink noise rise, due to the bursty traffic from different UEs being active with non predictable fashion, according to their traffic models and with activity factors being typically clearly lower than 1 for the allocated TFCS. One possibility is naturally to allocate a TFCS corresponding to some lower data rate for each UE, to minimise the UL noise rise variance, but this will mean that it will take longer time for the UEs to complete the transmission.

A possible solution how to improve the rel99 specification in this respect, would be that fast scheduling is introduced at NodeB level, and some kind of faster signaling is introduced between UE and NodeB, and in that way try to take care that each UEs activity factor for the currently allowed UL TFCS is close to 1.

Targets: The main target would be to minimise the variance of the uplink noise rise in the own cell by fast NodeB scheduling.

Potential benefit: If the uplink noise rise variance can be minimised with the above mentioned techniques, this method could potentially result in the increase in uplink throughput, through the smaller power margin requirement to combat the overload conditions.

Link adaptation at UE with closed loop power control

Method: A third possible approach how to introduce the enhancements for uplink would be to keep the power control on in uplink, and introduce some kind of link adaptation mechanism at the UE, to minimise the interference to neighboring cells.

The link adaptation could be done e.g. in such a way that a certain reference TFC is given to the UE by the network. Thus the UE would try to keep the transmit power level within a certain margin relative to the power level needed for the reference TFC, by changing the SF. This technique would be utilised closer to cell edge, since the accuracy of measuring the transmit power level is not probably not going to work properly with this scheme at smaller transmitter power levels, and also since the dominant area for creating interference to other cells is clearly the cell edge area.

Targets: The main target would be to minimise the variance of the uplink noise rise to neighboring cells.

Potential benefit: If the uplink noise rise variance to neighboring cells can be minimised with the above mentioned techniques, this method could potentially result in the increase in uplink throughput, through the smaller power margin requirement to combat the overload conditions.

3.2 HARQ

Hybrid ARQ schemes have been studied extensively for HSDPA. A MAC-hs layer fast HARQ based on N-process Stop-And-Wait (SAW) ARQ was introduced in Rel'5. The HARQ scheme of HSDPA is based on two-stage rate matching algorithm and supports both Chase combining and incremental redundancy (IR). In addition to combining gain, the HARQ, which is functioning between Node B and UE, provides shorter round trip delay than RLC based ARQ schemes of Rel'99 thus improving the end-to-end delay of the packet based services.

The HARQ schemes should provide gains also in the uplink both in throughput and delay performance. However, the differences of downlink and uplink have to be taken into account in the study, especially the need of power control and soft handover in the uplink. Also, the complexity issues, i.e., the required processing times both in the network and in the UE side as well as the required soft buffers in the network side have to be taken into account when assesing different schemes.

3.3 Soft handover

The HSDPA data and control channels are not in SHO, i.e., the downlink channels HS-SCCH and HS-DSCH are only transmitted from a Node B at a time and the uplink HS-DPCCH is received only by a Node B. In order to avoid severe intercell interference, our current understanding is that the uplink DCH should be in SHO whenever the UE can be heard by more than one Node B so that those Node Bs can contribute to the power control. Therefore, all the enhancements introduced for the DCH should be carefully studied with SHO, too. Especially, enhancements that require distributed control, such as Node B based scheduling or HARQ schemes between UE and Node B, need extra care since they introduce control signaling which is not in SHO, i.e., each Node B in the active set generates independent signaling. Due to SHO principle (= it is enough that only one Node B is heard by the UE), all the Node Bs in the active set may not be heard by the UE and this has to be taken into account when defining the enhancements. Similarly, the uplink signaling required for the enhancements may not be heard by all the Node Bs in the active set.

3.4 Physical layer structure

Uplink

Enhanced uplink traffic will be transmitted on DPDCH. Whether this will be modified to accommodate some shorter TTI length or continue with 10 ms TTI is up to further studies. It is noted that TTI shorter than 10 ms would necessitate a completely new dedicated control channel for uplink signalling. Since the backwards compatibility issues are to be discussed and kept in mind, it is noted that 10 ms TTI on the other hand would allow easy time-multiplexing of enhanced and other bearers e.g voice. Code multiplexing, i.e. enhanced DCH on one code channel and Rel99/rel4/ Rel.5 DCH on another, also raises some concerns due to the fact that it will have on impact on the PAR at the UE.

The uplink signalling may consist of HARQ and scheduling information, to name examples.The choice of the uplink control channel depends on the set of features chosen for uplink enhancements and the soft handover support. Among a number of possible alternatives the use of HS-DPCCH for uplink signalling of enhanced DCH may be feasible. On the other hand there are potential advantages with a new BPSK-modulated control channel in the I or Q branch.

The challenges the uplink enhancements face are different from the ones in downlink traffic. Consequently, the solution for enhanced uplink channel structure may differ substantially from the one chosen for HSDPA.

Downlink

The channel structure for the control signaling in the downlink should be defined in that way, that the UE is not required to support DSCH or HS-DSCH simultaneously. The control signalling could be inserted into DPCH, e.g. by creating space for it by puncturing, modifying the DPCCH /DPDCH structure, borrowing the TFCI bits or inserting a new transport channel. Another possibility could be to reserve a new code channel, either dedicated or common for several UEs, for the control signaling in the downlink.

3.5 Shorter frame size and improved QoS

We think that the study of shorter frame size could be coupled with the proposed scheduling scheme, here referring to comments given in section 3.1.

4. PROPOSED WAY FORWARD

There is a separate input paper in [4], containing a draft TR outline for Enhanced Uplink. The scope of this contribution is also to help to understand the proposed chapter division in the draft TR outline.

One additional point that we would like to raise at this point of time is that it is quite important to agree how the future performance evaluation is to be made for the proposed techniques for Enhanced Uplink DCH. The reference to which all the new techniques should be compared, should be the rel99/rel4/rel5 packet scheduling methods in uplink, including the current TFC selection method, for which performance requirements were just quite recently agreed in RAN WG4. Thus the agreed evaluation procedure should be such that only if incremental gain is found compared to rel99/rel4/rel5 methods, it can be considered to be seen feasible to be studied further.

The specification for the TFC selection procedure can be found from section 11.4 , "Transport format combination selection in UE" in [2], and the requirements for TFC selection at the maximum TX power can be found from section 6.4 "Transport format combination selection in UE", [3]. Also some definitions and requirements for setting TFCS , further utilised in TFC selection , can be found from [3]. Some latest RAN WG4 contributions on the TFC selection method can be found from [5, 6]. [6] contains the agreed CR on TFC selection method into [3].

Also the requirements for the Enhanced Uplink DCH should be discussed at the early phase, including the environments to operate etc. One requirement should be at least that the Enhanced Uplink DCH should be defined in such a way that it is possible to operate independently from HSDPA.

5. CONCLUSION

This paper discussed what kind of issues could and should be included in the study areas for each topic for Enhanced Uplink DCH. It was also made to help to understand the chapter division proposed in the draft TR outline in [4].

Further, it was raised up that it is important to clarify that the reference case for Enhanced Uplink DCH performance evalution should be the rel99/rel4/rel5 uplink packet scheduling, including the recently agreed TFC selection requirement at the UE maximum TX power in RAN4, explained in more detail in [5,6], and found from the specifications [2,3].

Finally , it was pointed out that the requirements section in the TR should be discussed at the early phase. And that at least one requirement should be that Enhanced Uplink DCH should be defined in such a way that it is possible to operate completely independently from HSDPA operation.

6. REFERENCES

[1] RP-020658 Uplink Enhancements for Dedicated Transport channels, Study item description.

[2] 3GPP TS 25.321 V3.12.0, release 99.

[3] 3GPP TS 25.133 v.3.10.0. release 99.

[4] R1-02-1218, Draft TR outline for Feasibility Study for Enhanced Uplink for UTRA FDD

[5] R4-020228, Simulation results for TFC selection, Nokia

[6] R4-020997, TFC selection CR389 rev1, Ericsson, Nokia

EXHIBIT K

3GPPRAN1#28-bis **Tdoc# R1-02-1250**
Espoo, Finland
October 8-9, 2002

Agenda Item: Uplink enhancements for dedicated transport channels
Source: **Motorola**
Title: **Details**
Document for: **Discussion**

Introduction

Future 3GPP systems should be capable to support symmetric services of up to 2 Mbps. In order to achieve this goal the peak and average data throughput of the uplink should also be increased compared to Release-5 specification. Applications of uplink enhancements includes background (video-clips, multimedia, e-mail, mobile web-browsing, telematics etc.) and interactive (gaming, video-streaming etc.) services. The HSDPA enhancements like Fast link adaptation using higher order modulation, fast Hybrid ARQ, smaller frame size and fast Node-B scheduling can also be applied in the uplink direction to improve its peak and average throughput. Work on enhancements to the uplink could be started based on the approved study item for Release-6.

Proposal

We propose several enhancements for packet data services for uplink using dedicated transport channels so that the system could support higher peak rates while maximising the capacity and coverage of the system using a new uplink channel called Enhanced Uplink Dedicated Transport Channel (EUDTC). The following enhancements are proposed below:

1. **Adaptive Modulation and Coding (AMCS):**

In cellular communication systems, the quality of a signal received by a subscriber device depends on distance from the desired and interfering base stations, path loss, log-normal shadowing, short term Rayleigh fading etc. In order to improve system capacity, peak data rate and coverage reliability, the signal transmitted to and by a particular user should be modified to account for the signal quality variation. The process of modifying the transmitted signal to compensate for signal quality variations is known as link adaptation. Two known link adaptation techniques are fast power control and adaptive modulation and coding (AMCS). In DS-CDMA systems fast power control in uplink is utilised to mitigate the near-far problem and to compensate for the variation due to short term Rayleigh fading. It may be noted that using fast scheduling combined with smaller frame size while targeting an appropriate noise rise level avoids the need to fast power control EUDTC. However, in order to assign all available UE power or meet a target threshold it is advantageous to vary EUDTC power on a slot-by-slot basis.

In view of the above, it is proposed that the EUDTC should support AMCS which in turn will support peak rates of up to 2 Mbps (using 1 code channel) as shown in Table 1. The table shows assignments for 1 code because of possible PAR degradation due to multiple codes. The basic block diagram of the EUDTC is shown in Figure 1.

The EUDTC will have the following features:

1. Should support BPSK, QPSK and possibly 8-PSK modulation.
2. Turbo Coder rates ranging from 0.2 to 1.
3. Smaller frame size (e.g. 2 msec).
4. Fast scheduling (e.g. using mainly Time Division Multiplexing).
5. Should support soft-handoff
6. Control information related to EUDTC may be piggybacked on the control channel for Rel-5 i.e. use HS-SHCCH for downlink and HS-DPCCH for uplink. Alternatively, the possibility of using 10 msec control channel frame size may also be investigated.

The EUDTC rate determination can be Node-B or UE based. Since the EUDTC is scheduled from Node-B it is preferable to have the former option. In case of Node-B based rate determination the UE signals the buffer size, power margin etc. to Node-B.

Rate #	Modulation	Enc Rate	SF	Ncodes	Rate (bit/sec)	DeltaPwr (dB)	Rate #	Modulation	Enc Rate	SF	Ncodes	Rate (bit/sec)	DeltaPwr (dB)
1	3	1	4	1	2880000	>>1	12	1	0.5	4	1	480000	1.4
2	3	0.8	4	1	2304000	0.8	13	1	0.4	4	1	384000	1.6
3	3	0.75	4	1	2160000	1.0	14	1	0.3	4	1	288000	1.4
4	3	0.666667	4	1	1920001	0.9	15	1	0.4	8	1	192000	1.6
5	3	0.6	4	1	1728000	0.0	16	1	0.3	8	1	144000	1.4
6	2	0.75	4	1	1440000	1.0	17	1	0.4	16	1	96000	1.6
7	2	0.666667	4	1	1280000	0.9	18	1	0.3	16	1	72000	1.4
8	2	0.6	4	1	1152000	1.3	19	1	0.4	32	1	48000	1.6
9	2	0.5	4	1	960000	1.4	20	1	0.3	32	1	36000	1.4
10	2	0.4	4	1	768000	1.6	21	1	0.4	64	1	24000	1.6
11	2	0.3	4	1	576000	0.1	22	1	0.3	64	1	18000	

Table 1. Possible EUDTC Rates

2. Hybrid ARQ (HARQ):

Automatic-Repeat-Request (ARQ) schemes are used in packet data communication system. The simplest form of hybrid ARQ scheme was proposed by Chase [1]. The basic idea in Chase's scheme is to send a number of repeats of each coded data packet and allowing the decoder to combine multiple received copies of the coded packet weighted by the SNR prior to decoding. This method provides diversity gain and is very simple to implement. Turbo codes can also be used to improve the efficiency of hybrid ARQ schemes. Instead of sending simple repeats of the coded data packet, this form of hybrid ARQ called Incremental Redundancy (IR) sends progressive parity packets corresponding to code rate of R= 3/4, 1/2 etc i.e. in each subsequent transmission of the packet the code rate is increased. Both Chase and IR based HARQ schemes were studied extensively during the development of HSDPA for Rel-5. It is intended to support both these schemes using rate matching for EUDTC. The use of HARQ during soft-handoff operation also should be investigated.

3. Smaller Frame Size:

The current 3GPP W-CDMA specification supports uplink DCH with frame size of 10 msec. In order to support fast scheduling using HARQ and AMCS in an efficient manner it is desirable to have smaller frame size (e.g. 2msec) similar to HS-DSCH. Further, smaller frame sizes reduces the payload to a manageable level. As such it is proposed, to consider smaller frame size (e.g. 3 slots) for the EUDTC.

4. Position of Scheduling Mechanism:

In order to accomplish the gains of Hybrid ARQ/AMCS, the EUDTC needs to be scheduled from Node B based on a smaller frame size (e.g. 2 msec). It may also be preferable to schedule one UE at a time in a TDM fashion so as to reduce the uplink interference and reducing the scheduling complexity. Also, the scheduler needs to make assignments based on physical parameters such as uplink noise rise, power margin at the UE, Queue/Buffer size etc. Capacity is improved if the delay is reduced between this measurement information becoming available and the signalling of the allocations which can be accomplished using de-centralised scheduling.

5. Fast DCH Setup:

One of the key objectives of the study is to reduce the setup time for the DCH e.g. the transition from CELL_PCH state to CELL_DCH state and CELL_FACH state to CELL_DCH state.

6. Control channel design to support EUDTC:

One of the options for control channel design of EUDTC is to use the control channels for Rel-5 HS-DSCH to piggyback the control information required for EUDTC. This can be achieved by defining an additional frame format for HS-SCCH and HS-DPCCH. The second option is to define a new set of control channels to support EUDTC operation. Finally, the third option is to use 10 msec frame size. Further, the design of control channels when the UE is in soft-handoff should be addressed.

References

[1] D. Chase, "A Class of Algorithms for Decoding Block Codes With Channel Measurement Information," *IEEE Trans. Inform. Theory*, vol. IT-18, pp. 170-182, Jan. 1972.

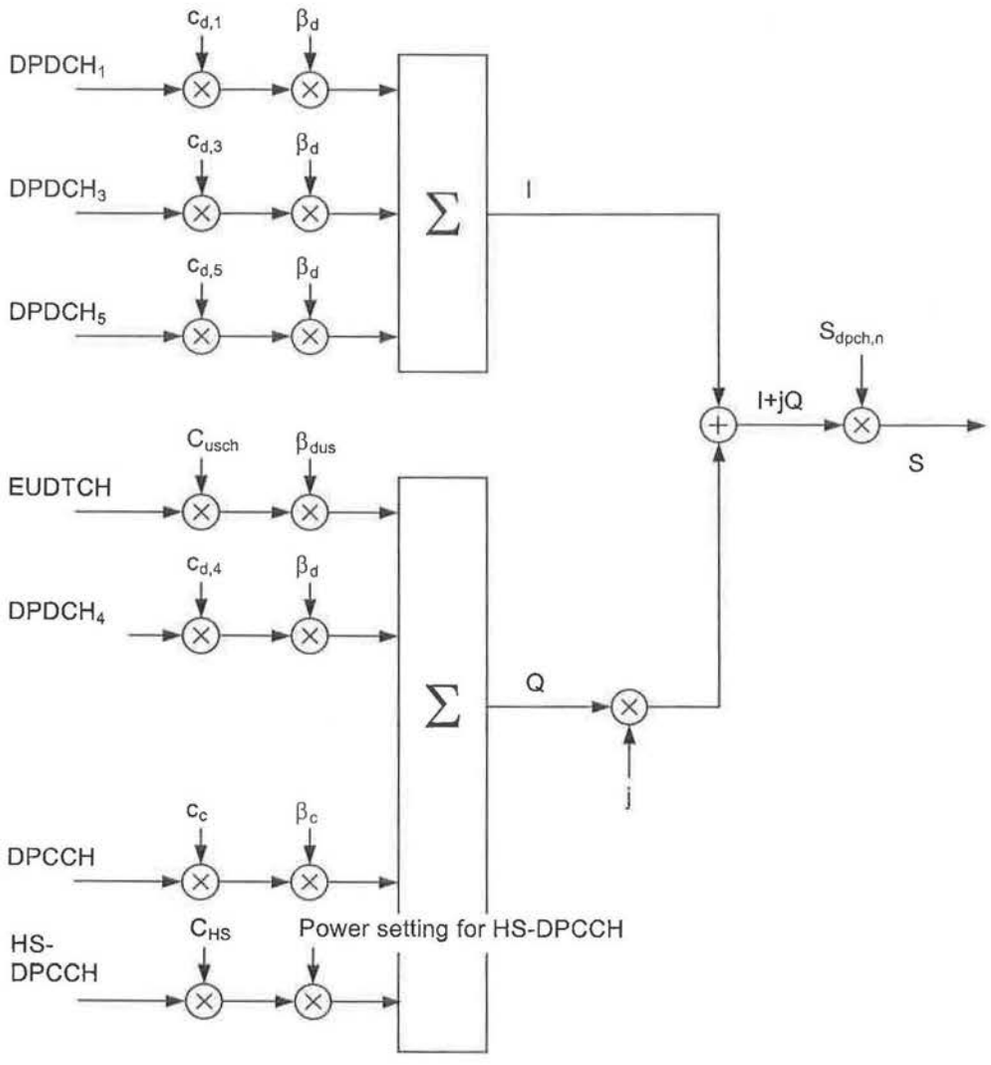

Figure 1. Enhanced Uplink Dedicated Transport Channel

EXHIBIT L

TSG-RAN Working Group 1 #30 **Tdoc R1-030004**
San Diego, USA
January 7-10, 2003

Source: **Siemens**

Title: **Downlink Control Channel Configuration for Enhanced Uplink Dedicated Transport Channel**

Agenda Item: **AH 64 (Enhanced Uplink DCH)**

Document for: **Discussion and Decision**

1. Introduction

In 3GPP TSG RAN WG1 a feasibility study on enhanced uplink dedicated Transport Channel (denoted as EU-DCH in the sequel) for UTRA FDD has started. The general idea of this study is to investigate performance enhancement techniques, like adaptive modulation and coding, HARQ and fast scheduling in combinations with shorter frame sizes. In this paper possible configurations of the associated downlink control channel are addressed. In particular the re-use of HS-SCCH versus the definition of a new shared control channel is discussed.

2. Re-use of HS-SCCH

Re-using the existing HSDPA downlink control channel (HS-SCCH) is a means to alleviate the downlink code resource problem by providing trunking gain between EU-DCH and HS-DSCH users. This is achieved by reusing the downlink HS-SCCH also for downlink control information of EU-DCH (denoted as EU-SCCH in the sequel). Consequently, EU-SCCH uses also a 3-slot format and is time-aligned at Node B with HS-SCCH transmissions. This particular format for EU-DCH associated downlink control information allows the same shared control channel to be used for EU-DCH and HSDPA users in time multiplex. Downlink code resources are saved, since the Node B has more flexibility in HS-SCCH/EU-SCCH usage and can more often assure that the codes allocated to HS-SCCH and EU-SCCH are fully utilised in the time domain. The number of HS-SCCH channels is adopted to the joint traffic of HSDPA and EU-DCH. Additionally it decreases UE complexity, since less control channels need to be monitored in cases where HS-DSCH and EU-DCH are used concurrently.

A further simplification of the UE implementation is possible if exactly the coding format of HS-SCCH part 1 is re-used. This is possible if the signalling payload is four bits or less. As shown in Fig. 1, the HS-SCCH part 1 provides 8 unused codewords within the channelisation code-set field (denoted as "redundant area" in Fig. 1, [1]), which could be used for EU-DCH downlink signalling.

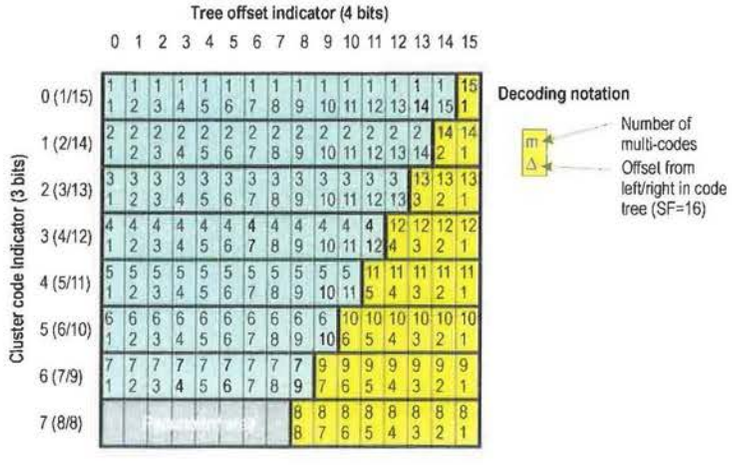

Fig 1: Reuse of the redundant area of HS-SCCH part 1 for downlink signalling of EU-DCH

Furthermore, the modulation bit of HS-SCCH part 1 can be used for different purposes in EU-DCH[1]. A major benefit of the re-use of HS-SCCH channel *and* coding format is that the detection based on the implicit UE-ID and decoding of part 1 is identical for HSDPA and EU-DCH data transmission and receiver implementation is notably simplified. Note, that current proposals differ significantly in the number of required downlink signalling bits [2, 3]. If the total downlink signalling payload is less or equal to four bit, only part 1 could be used.

3. New Downlink Shared Control Channel

Another alternative is to define a new shared control channel for EU-DCH. In this case no trunking gain is obtained and additional downlink code resources are required. However, in this case the format and coding of this control channel can be optimised for the payload size. In particular if few downlink signalling bits are required, higher spreading factors (e.g., SF = 256 or 512) than applied to HS-SCCH can be used and/or shorter sub-frame duration can be adopted (which allows to accommodate more users per channel in time-multiplex). Thus the total code consumption of this alternative might not be significantly higher than of re-using HS-SCCH. Note, that anyhow, it is favourable not to schedule too many EU-DCH users concurrently to keep the dynamics of the noise rise within feasible limits. The main benefit of this approach is that the detection and decoding performance of this control channel can be optimised for the given payload and that it is not related to the performance of HS-SCCH. Another benefit is, that a separate downlink control channel would allow higher flexibility in relative channel timing, the resulting round trip delay, and available processing times at UE and Node B.

4. Conclusions

This paper investigates different possibilities for configuration of the downlink control channel for EU-DCH. The re-use of HS-SCCH for EU-DCH downlink signalling is compared to the definition of a new shared channel with higher spreading factor and/or shorter frame size. The former strategy offers trunking gain between HSDPA and EU-DCH operation, i.e., improves downlink code consumption. A further advantage is that the detection based on the implicit UE-ID and decoding is identical for HSDPA and EU-DCH. Thus receiver implementation is notably simplified. However, if a new shared downlink channel for downlink control signalling is used, the format and coding can be optimised for the given payload size. Depending on the payload size, higher spreading factors (e.g., SF = 256 or 512) or shorter sub-frame duration can be adopted. Thus the total code consumption of this approach might not be significantly higher. The preference for one of these two possibilities will mainly depend on the size of the downlink control signalling payload.

5. References

[1] 3GPP TSG RAN WG 1 Tdoc R1-02-0018, Nokia, "Compact signalling of multi-code allocation for HSDPA, version 2," Espoo, Finland, January 2002,

[2] 3GPP TSG RAN WG 1 Tdoc R1-02-1277, Nokia, "Two Threshold Node B Packet Scheduling," Shanghai, China, November 2002,

[3] 3GPP TSG RAN WG 1 Tdoc R1-02-1350, Motorola, "Design Considerations for Enhanced Uplink Dedicated Channel," Shanghai, China, November 2002.

[1] If fast CQI signalling is adopted the number of available codewords is slightly less than 16.

EXHIBIT M

DTW

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Total Number of Pages in This Submission

Application Number	60/523,049
Filing Date	November 18, 2003
First Named Inventor	Rudolf et al.
Art Unit	Not Yet Known
Examiner Name	Not Yet Known
Attorney Docket Number	I-2-0541US

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
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Firm Name	Volpe and Koenig, P.C.		
Signature			
Printed name	Gerald B. Hall, Jr.		
Date	September 11, 2007	Reg. No.	37,633

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Application Number	60/523,049
Filing Date	November 18, 2003
First Named Inventor	Rudolf et al.
Title	EXTENDED HS-SCCH FOR FDD ENHANCED UL OPERATION
Art Unit	Not Yet Known
Examiner Name	Not Yet Known
Attorney Docket Number	I-2-0541US

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[X] Applicant/Inventor.

[ ] Assignee of record of the entire interest. See 37 CFR 3.71.
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Date	26 March 2004	Telephone	514-904-6258

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Name	Stephen G. Dick		
Signature	Stephen G. Dick		
Date	March 19, 2004	Telephone	

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Application Number	60/523,049
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Name	Philip J. Pietraski		
Signature			
Date	03/19/2004	Telephone	

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INVENTOR(S)		
Given Name (first and middle (if any))	Family Name or Surname	Residence (City and either State or Foreign Country)
Marian	Rudolf	Montreal, QC, Canada

Additional inventors are being named on the 2 *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

EXTENDED HS-SCCH FOR FDD ENHANCED UL OPERATION

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

[X] Customer Number: 24374

OR

[X] Firm or Individual Name: VOLPE AND KOENIG, P.C., DEPT ICC

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Address					
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ENCLOSED APPLICATION PARTS ***(check all that apply)***

[X] Specification *Number of Pages* 13
[X] Drawing(s) *Number of Sheets* 2
[X] Application Data Sheet. See 37 CFR 1.76
[ ] CD(s), Number
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Respectfully submitted,

SIGNATURE

TYPED or PRINTED NAME Jeffrey M. Glabicki

Date November 18, 2003

REGISTRATION NO. 42,584 *(if appropriate)*

Docket Number: I-2-0541US

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Docket Number I-2-0541US

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[0001] # NOVEL RESOURCE ASSIGNMENT CHANNEL CONFIGURATION FOR ENHANCED UPLINK OPERATION

[0002] ## FIELD OF THE INVENTION

[0003] The invention relates generally to wireless communication and, more specifically, to a resource assignment channel for providing enhanced uplink operation.

[0004] ## BACKGROUND

[0005] Pursuant to universal mobile telecommunications system (UMTS) release six (R6), frequency division duplex (FDD) uplink (UL) enhancement has been identified as an item which merits further study. This item, referred to hereinafter as "FDD Enhanced UL", is intended to provide benefits for the UMTS UL that are presently provided in the context of high speed downlink packet access (HSDPA). Moreover, in UMTS release five (R5), it is envisioned that features such as fast Hybrid automatic repeat request (ARQ), link adaptation and fast Node B scheduling will be incorporated into the FDD Enhanced UL in a manner roughly analogous to that which currently exists for HSPDA. However, the manner in which such incorporation might take place has yet to be determined.

[0006] One objective of HSDPA is to increase downlink (DL) efficiency and throughput. HSDPA provides rapid, dynamic DL adaptation by means of fast scheduling in the base station, coupled with fast and efficient layer 1 (L1)-based DL signaling channels. These signaling channels, referred to as high speed shared control channels (HS-SCCHs) are employed to convey radio resource allocations to user equipment (UE). Another aspect of HSDPA operation is fast L1-based hybrid automatic repeat requests (H-ARQ).

[0007] In wideband code division multiple access (W-CDMA) frequency division duplex (FDD) systems, a release five (R5) HS-SCCH is sent by means of a spreading

factor (SF)=128 channelization code during a 3-timeslot transmission timing interval (TTI), where TTI = 2 ms. The HS-SCCH indicates that subsequently, as specified by a fixed timing offset, data on a high-speed downlink shared channel is to be received by a particular mobile. The HS-SCCH conveys the following information:

- Channelization-code-set information (7 bits)
- Modulation scheme information (1 bit)
- Transport-block size information (6 bits)
- Hybrid-ARQ (H-ARQ) process information (3 bits)
- Redundancy and constellation version (3 bits)
- New data indicator (1 bit)
- User equipment (UE) identity (16 bits)

[0008] The R5 HS-SCCH is sent over 3 time slots (TSs) at a 2 ms time interval, but includes 2 fields: field 1 (in a first TS) containing channelization code mapping information and modulation format information, and field 2 (in the second and third TS's) containing transport block size information, H-ARQ information, redundancy version and new data indicator, along with a UE-specific cyclic redundancy check (CRC) (see 3GPP TS25.212). The 40-bit-long, convolutionally coded and punctured bit sequence of field 1 is masked by a UE-specific masking sequence.

[0009] The UE-specific masking sequence is derived from the 16-bit long UE-identity, rate ½ convolutional coding by adding tailbits and puncturing 8 bits from the resulting 48-bit long sequence to obtain a 40 bit masking sequence. The UE-identity masked CRC is computed over the whole HS-SCCH content, but sent as part of field 2 (in the second and third TS).

[0010] Refering to FIG. 1, which is a data structure diagram setting forth an illustrative coding chain for R5 HS-SCCH in conformance with standard TS25.212 v5.4.0. The importance of encoding HS-SCCH field 1 and field 2 separately is that

information contained in field 1 can be used to receive the high speed downlink shared channel (HS-DSCH) (i.e. 2 TS's after begin of HS-SCCH) prior to decoding of the remaining information on the HS-SCCH in field 2. This functionality is important for ensuring low allocation latencies for HSDPA operation.

[0011] It is possible to utilize a new type of fast shared DL control channel in conjunction with FDD Enhanced UL. Such a channel could operate in a manner roughly analogous to that of R5 HSDPA, thereby permitting fast and dynamic allocation of UL resources to UEs. Ideally, this DL control channel should ensure low allocation latencies while being resource efficient in the DL so as to provide FDD Enhanced UL service. Hereinafter, this new DL shared control channel for purposes of FDD Enhanced UL service is referred to as a "UL Resource Assignment Channel".

[0012] The UL Resource Assignment Channel illustratively includes the following list of information:

- Fast UL scheduling / resource assignments,
- UL interference levels / margins,
- A UE's particular, allowed UL Transport-Format-Combination to be used for its UL transmission,
- Hybrid ARQ status information.

[0013] In addition to radio resource utilization efficiency (shared vs. dedicated type control channel), the following design considerations are applicable to the UL Resource Assignment Channel:

- Battery efficient operation for an FDD Enhanced UL UE when monitoring UL Resource Assignment Channel
- Backward compatibility with R99-R5 in general and with HSDPA R5 channels like HS-SCCH in particular,
- Keeping additional hardware complexity for an FDD Enhanced UL UE low,
- Latency requirements (10 ms vs. 2 ms transmission time intervals),

[0014] In a straightforward extension of existing R5 mechanisms, UL Resource Assignment Channel's for FDD Enhanced UL could be introduced "on top" of existing HS-SCCH's for HSDPA. In other words, a separate set of SF=128 DL channels are configured to contain one or more UL Resource Assignment Channels. With this approach, in a typical HSDPA operation scenario, a UE would then be required to monitor one or several UL Resource Assignment Channels in addition to the up to 4 HS-SCCHs it must already monitor.

[0015] There are at least three basic drawbacks to the straightforward extension of existing R5 mechanisms:

- Increased UE complexity,
- Decreased UE battery efficiency, and
- DL spreading code usage / blocking.

[0016] The following abbreviations are used in the present patent application:

ARQ	automatic repeat request
CDMA	code division multiple access
CRC	cyclic redundancy check
DCH	dedicated channel
DL	downlink
FDD	frequency division duplex
H-ARQ	hybrid automatic repeat request
HS-DSCH	high speed downlink shared channel
HS-SCCH	high speed shared control channel
HSPDA	high speed downlink packet access
L1	layer one
OVSF	orthogonal variable spreading factor
R4	release four
R5	release five

R6	release six
SF	spreading factor
TDD	time division duplex
TS	time slot
TTI	transmission timing interval
W-CDMA	wideband CDMA
UE	user equipment
UL	uplink
UMTS	universal mobile telecommunications service

[0017] SUMMARY

[0018] The foregoing and other shortcomings of the prior art are resolved by providing a high speed shared control channel (HS-SCCH) and an uplink (UL) resource assignment channel in a shared downlink (DL) radio resource space, and by distinguishing received high speed shared control channel (HS-SCCH) transmissions from uplink (UL) resource assignment channel transmissions. HS-SCCH transmissions are utilized in conjunction with high speed downlink packet access (HSDPA), whereas UL resource assignment channels are employed in the context of frequency division duplex (FDD)-enhanced uplinks. The distinguishing of a received transmission is implemented after periodically or repeatedly demodulating a set of downlink (DL) shared control channels and confirming that the demodulated transmission is intended for the UE. The set of DL shared control channels may be demodulated at a transmission timing interval (TTI), illustratively every 2 ms, at a user equipment (UE). Confirmation that a demodulated transmission is intended for the UE is obtained using a UE-specific CRC.

[0019] Relative to the prior art approaches described hereinbefore, a high speed shared control channel (HS-SCCH) and an uplink (UL) resource assignment channel that occupy a shared downlink (DL) radio resource space reduces UE complexity,

increases UE battery efficiency, and permits enhanced DL spreading code usage. HS-SCCH transmissions are utilized in conjunction with HSDPA, whereas UL resource assignment channels are employed in the context of frequency division duplex (FDD)-enhanced UL.

[0020] A transmission distinguishing method is useful in situations where a wireless communication network is called upon to simultaneously implement HSPDA and FDD-enhanced UL. In practice, this task is complicated by the fact that the HS-SCCH and the UL Resource Assignment Channel occupy a shared DL radio resource space. Pursuant to the techniques of the present invention, any of several methods may be employed to distinguish HS-SCCH transmissions from UL Resource Assignment channel transmissions. These methods include: (a) channel indication by means of selecting one or more "impossible" combinations in channelization code set mapping, (b) inversion of UE-specific cyclic redundancy check (CRC), (c) utilizing different UE-specific masking sequences, (d) radio resource control (RRC) context signaling, and (e) fast layer one (L1) indication on an associated DL dedicated channel (DCH).

[0021] BRIEF DESCRIPTION OF THE DRAWING(S)

[0022] FIG. 1 is a diagrammatic representation of a prior art coding chain for R5 HS-SCCH; and

[0023] FIG. 2 is a diagrammatic representation of "impossible" combinations for R5 HS-SCCH as specified by current channelization code set mapping schemes.

[0024] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Pursuant to the systems and methods of the present invention, an HS-SCCH and a UL resource assignment channel are provided in a shared DL radio resource space. Received high speed shared control channel HS-SCCH transmissions

are rendered distinguishable from UL resource assignment channel transmissions. HS-SCCH transmissions are utilized in conjunction with HSDPA, whereas UL resource assignment channels are employed in the context of FDD-enhanced UL's. The distinguishing of a received transmission is implemented after periodically or repeatedly demodulating a set of DL shared control channels and confirming that the demodulated transmission is intended for the UE. The set of DL shared control channels may be demodulated at a transmission timing interval (TTI), illustratively every 2 ms, at a UE. Confirmation that a demodulated transmission is intended for the UE is obtained using a UE-specific CRC.

[0026] Relative to the prior art approaches described hereinbefore, a HS-SCCH and a UL resource assignment channel that occupy a shared DL radio resource space reduce UE complexity, increase UE battery efficiency, and permit enhanced DL spreading code usage. HS-SCCH transmissions are utilized in conjunction with HSDPA, whereas UL resource assignment channels are employed in the context of frequency division duplex (FDD)-enhanced UL.

[0027] Pursuant to the techniques of the present invention, any of several methods may be employed to distinguish HS-SCCH transmissions from UL Resource Assignment channel transmissions. These methods include: (a) channel indication by means of selecting one or more "impossible" combinations in channelization code set mapping, (b) inversion of UE-specific cyclic redundancy check (CRC), (c) utilizing different UE-specific masking sequences, (d) radio resource control (RRC) context signaling, and (e) fast layer one (L1) indication on an associated DL dedicated channel (DCH).

[0028] A transmission distinguishing method is useful in situations where a wireless communication network is called upon to simultaneously implement HSPDA and FDD-enhanced UL. In practice, this task is complicated by the fact that the HS-SCCH and the UL Resource Assignment Channel occupy a shared DL radio resource space.

[0029] Consider a network that is equipped to operate pursuant to universal mobile telecommunications service Release 5 (UMTS R5) W-CDMA. For an R5 HS-SCCH, the shared radio resource space includes a UE-specific radio resource code. This shared resource space includes a UE-specific radio resource code (RRC) allocated set of spreading factor (SF)=128 channelization codes used for both types of channels in networks where FDD-enhanced UL and HSDPA operate simultaneously. Even if the information contents of the UL resource assignment channel are likely to be different from that of the R5 HS-SCCH, the number of overall payload bits is likely to be of approximately the same order. Also, H-ARQ design considerations will enhance the probability that the UL Resource Assignment Channel will have a TTI similar to R5 HS-SCCH (i.e., 2 ms).

[0030] The R5 HS-SCCH and the UL Resource Assignment Channel occupy a shared DL radio resource space in the form of a UE-specific RRC allocated set of SF=128 channelization codes used for both types of channels if FDD Enhanced UL and HSDPA operate simultaneously.

[0031] Pursuant to a preferred embodiment of the invention which operates in the context of FDD Enhanced UL and HSDPA, the following steps are performed:

1. Demodulating the relevant set of SF=128 DL shared control channels every 2 ms TTI at the UE,

2. Determining if the transmission was intended for the UE (using the UE-specific CRC),

3. Determining, illustratively by means of one or a combination of the proposed methods set forth hereinafter, if the received transmission is an R5 HS-SCCH for HSDPA or an UL Resource Assignment Channel for FDD Enhanced UL,

4. Optionally, based on the determination of step (3), taking further action.

[0032] Even if the information contents of the UL Resource Assignment Channel are likely to be different from R5 HS-SCCH, the number of overall payload bits is likely to be of about the same order. Also, H-ARQ design considerations will make it likely,

that UL Resource Assignment Channel will have a TTI similar to R5 HS-SCCH (2 ms).

Method 1: Channel Indication by Selecting One or more "Impossible" Combinations in the Channelization Code Set Mapping

[0033] Current R5 HS-SCCH uses 7 bits to tell the UE which SF=16 channelization codes where used for the corresponding HS-DSCH TTI. Out of the 2^7 = 128 possible combinations (number of SF=16 codes x where to find them in the orthogonal variable spreading factor (OVSF) code tree), 8 combinations are not used in R5. As an example, the 8 currently available impossible combinations contained in the channelization code set mapping table of R5 HS-SCCH are shown in FIG. 2. The so-called "impossible" combinations are shown in grey shading at the lower left hand corner of the figure, where the columns headed 0 through 7 meet the row labeled 7(8/8). One or more of the impossible combinations on the R5 HS-SCCH is used to indicate that the demodulated TTI is a FDD Enhanced UL Resource Assignment Channel, and not a R5 HS-SCCH.

Method 2: Inversion of UE-specific CRC

[0034] The UE-specific CRC contained in HS-SCCH field 2 is modified in a unique and deterministic manner to indicate that the demodulated TTI is a FDD Enhanced UL Resource Assignment Channel and not a R5 HS-SCCH. One example of unique deterministic modification is inverting and then scrambling the computed CRC of field 1 and field 2 bits. The UE tests for 2 different hypotheses when comparing the CRC of the received HS-SCCH with the decoded HS-SCCH. Pursuant to this method, the UE performs the function of distinguishing whether UL Resource Assignment Channel or a R5 HS-SCCH has been decoded after having received the full transmission.

Method 3: Different UE-specific masking sequence

[0035] The UE-specific masking on field 1 is modified in a unique and

deterministic way to indicate that the demodulated TTI is a FDD Enhanced UL Resource Assignment Channel and not a R5 HS-SCCH. An example of such a modification is using the inverted CRC to derive the 40-bit long masking sequence by means of convolutional coding. Pursuant to this method, the UE can make the distinction as to whether UL Resource Assignment Channel or a R5 HS-SCCH has been decoded after having received only field 1 of the transmission. This approach has the advantage of keeping latencies low.

Addition to Methods 2 and 3: Allocation of UE-id's by network

[0036] UE-ID's are allocated by the network in such a way that simultaneous detection of the presence of the UL resource assignment channel and the R5 HS-SCCH is facilitated for UEs, and such that different UEs allocated UE-identifiers (UE-ids) do not collide. Illustratively, UE 1's inverted UE-id for FDD Enhanced UL usage is used to indicate also UE 2's HSDPA service. The network allocates UE-ID n for HSDPA service and inversion of UE-ID n for FDD Enhanced UL usage such that decision process of UL Resource Assignment Channel vs. HS-SCCH is easy.

Method 4: RRC context signaling

[0037] Semi-static RRC signaling informs a UE in which TTI or TTI's to expect a HS-SCCH or an UL resource assignment channel when the UE is configured for HSDPA service, i.e. moved from CELL_FACH into CELL_DCH state. For example, let "even" HS-SCCH TTI's be the following groups of 3 subsequent TS's: 1-3, 7-9, 13-15. "Odd" TTI's would be accordingly: TS's 4-6 and 10-12. RRC signaling could signal the following: Anything received in "even" TTI's is a R5 HS-SCCH and "odd" TTI's can only contain UL Resource Assignment Channel's. By not allowing R5 HS-SCCH's to be transmitted in "odd" TTI's, backwards compatibility with R5 legacy UE's can be ensured (requires new RRC signaling from RNC->UE and new Iub/Iur signaling from RNC->Node B). The same set of SF=128 resources can therefore be used for R5 HS-SCCH and UL Resource Assignment Channel in the cell and UE hardware complexity

be kept low.

Method 5: Fast L1 indication on associated DL DCH

[0038] One or more bits on the associated DL Dedicated Channel is used to indicate imminent occurrence of an UL resource assignment channel as opposed to a R5 HS-SCCH by means of a fixed and pre-determined timing relationship.

* * *

CLAIMS

What is claimed is:

1. A method for communicating with a user equipment (UE) over a wireless link comprised of a downlink (DL) and an uplink (UL), the method comprising the steps of:

(a) sharing at least a portion of the DL so as to provide a high speed shared control channel (HS-SCCH) and an UL resource assignment channel, and

(b) distinguishing received high speed shared control channel (HS-SCCH) transmissions from uplink (UL) resource assignment channel transmissions.

2. A method for communicating with a user equipment (UE) over a wireless link comprised of a downlink (DL) and an uplink (UL), the DL including a set of shared control channels, the method comprising the steps of:

a) periodically or repeatedly demodulating the set of shared control channels,

b) determining if the transmission was intended for the UE by using a UE-specific cyclic redundancy check, and

c) determining if the received transmission is an R5 HS-SCCH for HSDPA or an UL Resource Assignment Channel for FDD Enhanced UL.

ABSTRACT

A novel resource assignment channel enhances uplink operation. Specifically, a high speed shared control channel (HS-SCCH) and an uplink (UL) resource assignment channel are provided in a shared downlink (DL) radio resource space, and received high speed shared control channel (HS-SCCH) transmissions are rendered distinguishable from uplink (UL) resource assignment channel transmissions. HS-SCCH transmissions are utilized in conjunction with high speed downlink packet access (HSDPA), whereas UL resource assignment channels are employed in the context of frequency division duplex (FDD)-enhanced uplinks. The distinguishing of a received transmission is implemented after periodically or repeatedly demodulating a set of downlink (DL) shared control channels and confirming that the demodulated transmission is intended for the UE.

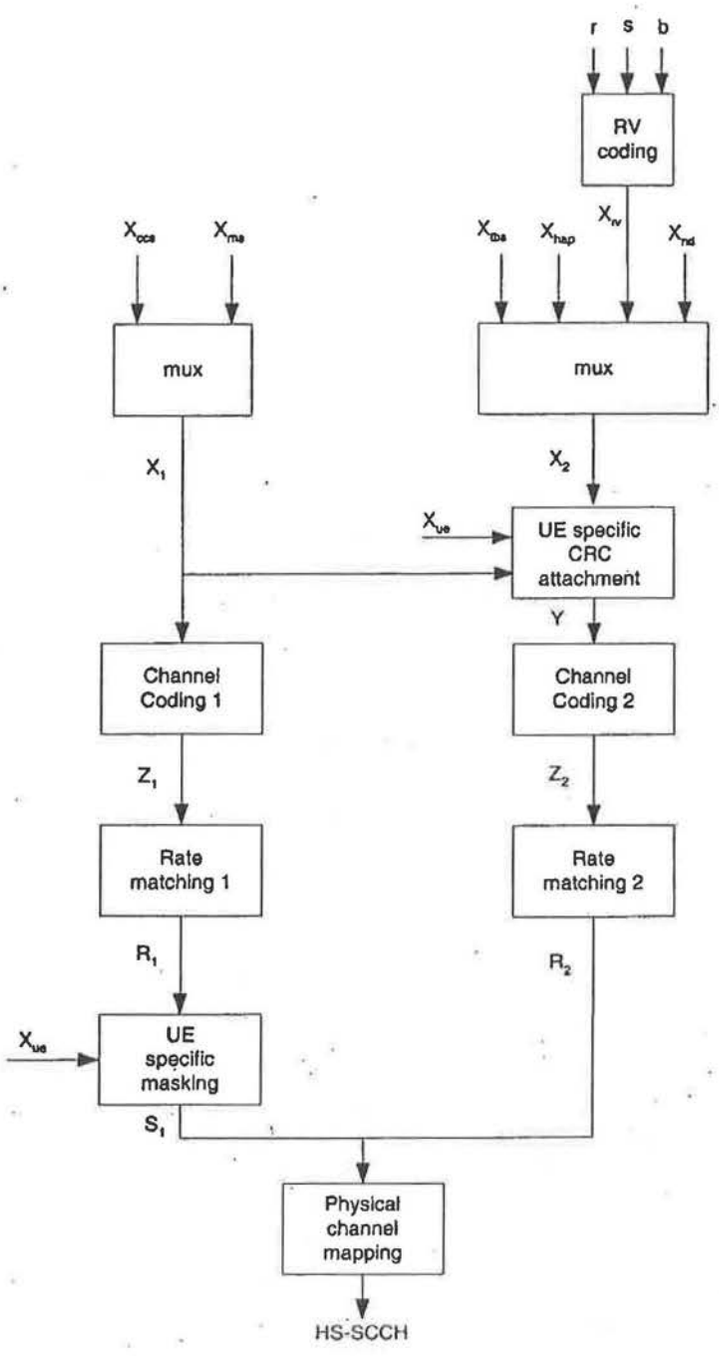

FIG. 1 (PRIOR ART)

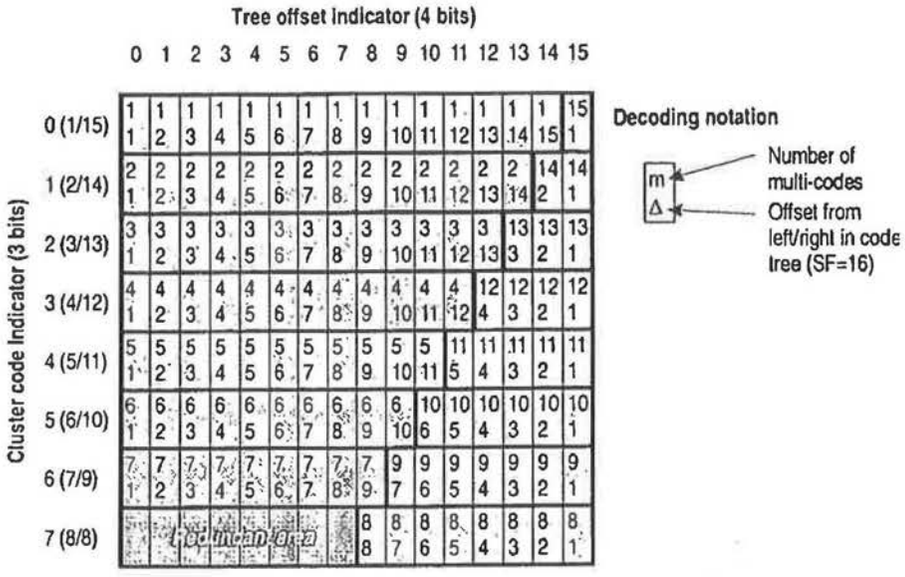
Tree offset indicator (4 bits)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Cluster code Indicator (3 bits)
0 (1/15)
1 (2/14)
2 (3/13)
3 (4/12)
4 (5/11)
5 (6/10)
6 (7/9)
7 (8/8)
Decoding notation
m
Δ
Number of multi-codes
Offset from left/right in code tree (SF=16)

FIG. 2

Express Mail Label No. EV 397261755 US

APPLICATION DATA SHEET
UNDER 37 CFR §1.76

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(4) Application Information

Title Line One::	EXTENDED HS-SCCH FOR FDD ENHANCED
Title Line Two::	UL OPERATION
Total Drawing Sheets::	2
Drawing Type::	Not Applicable
Application Type::	Provisional
Docket No.::	I-2-0541US

(5) Representative Information

Representative Customer No.:: 24374

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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	I-2-0541.1US
First Inventor	Rudolf et al.
Title	METHOD AND SYSTEM FOR PROVIDING CHANNEL ASSIGNMENT INFORMATION USED TO SUPPORT UPLINK AND DOWNLINK CHANNELS
Express Mail Label No.	EV396083784US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

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1. [x] Fee Transmittal Form (e.g., PTO/SB/17)
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2. [ ] Applicant claims small entity status.
See 37 CFR 1.27.
3. [x] Specification [*Total Pages* 15]
(preferred arrangement set forth below)
- Descriptive title of the invention
- Cross Reference to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to sequence listing, a table, or a computer program listing appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings *(if filed)*
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

4. [x] Drawing(s) *(35 U.S.C. 113)* [*Total Sheets* 2]
5. Oath or Declaration [*Total Sheets*]
a. [ ] Newly executed (original or copy)
b. [ ] Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 18 completed)
i. [ ] DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. [x] Application Data Sheet. See 37 CFR 1.76
7. [ ] CD-ROM or CD-R in duplicate, large table or Computer Program *(Appendix)*
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
a. [ ] Computer Reader Form (CRF)
b. Specification Sequence Listing on:
i. [ ] CD-ROM or CD-R (2 copies); or
ii. [ ] Paper
c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. [ ] Assignment Papers (cover sheet & document(s))
10. [ ] 37 CFR 3.73(b) Statement [ ] Power of Attorney
(when there is an assignee)
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
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[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No.: .....

Prior application information: *Examiner* _____ *Art Unit:* _____

For CONTINUATION OF DIVISIONAL APPS only; The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

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Signature	Scott Wolinsky	*Date*	July 29, 2004

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[0001] METHOD AND SYSTEM FOR PROVIDING CHANNEL ASSIGNMENT INFORMATION USED TO SUPPORT UPLINK AND DOWNLINK CHANNELS

[0002] CROSS REFERENCE TO RELATED APPLICATION

[0003] This application claims the benefit of U.S. Provisional Application No. 60/523,049 filed on November 18, 2003, which is incorporated by reference as if fully set forth.

[0004] FIELD OF INVENTION

[0005] The present invention is related to a wireless communication system. More particularly, the present invention is related to a method and system for providing channel assignment information to support uplink and downlink transmissions.

[0006] BACKGROUND

[0007] High speed downlink packet access (HSDPA) has been developed to increase downlink (DL) efficiency and throughput in universal mobile telecommunication system (UMTS) Release 5 (R5) wideband code division multiple access (W-CDMA) systems. The key advantages of HSDPA as compared to UMTS R99/R4 are fast and dynamic link adaptation in the DL and a fast layer 1 hybrid automatic repeat request (H-ARQ). Fast link adaptation is achieved by fast scheduling DL transmissions in a base station, coupled with fast layer 1 DL signaling channels. The signaling channel, a high speed shared control channel (HS-SCCH), conveys radio resource allocation information to a plurality of wireless transmit/receive units (WTRUs).

[0008] In frequency division duplex (FDD), an HS-SCCH is sent by means of a spreading factor (SF) = 128 channelization code during a three (3) time slot transmission time interval (TTI). The HS-SCCH indicates that data would be transmitted to a WTRU on a high speed downlink shared channel (HS-DSCH) after a

particular time offset. The HS-SCCH carries the following information: 1) channelization-code-set information (7 bits); 2) modulation scheme information (1 bit); 3) transport-block size information (6 bits); 4) H-ARQ process information (3 bits); 5) redundancy and constellation version (3 bits); 6) new data indicator (1 bit); and 7) a WTRU identity (16 bits).

[0009] The HS-SCCH is sent over three (3) time slots (2 ms TTI), but consists of two (2) fields. Field 1 (first time slot) contains channelization code mapping and modulation format information; and field 2 (second and third time slots) contains transport block size, H-ARQ information, redundancy version and a new data indicator along with a WTRU-specific cyclic redundancy check (CRC).

[0010] Alternatively, an enhanced uplink (EU) increases uplink (UL) efficiency and throughput. H-ARQ and Node-B scheduling is part of the EU. Similar to an HSDPA, a new shared DL control channel for EU operation provides fast and dynamic allocation of UL radio resources for UL transmissions. The shared DL control channel for the EU needs to ensure low allocation latencies and efficient radio resources management for UL transmissions. Hereinafter, the shared DL control channel for the purposes of an EU is simply referred to as a UL resource assignment channel.

[0011] In order to implement an EU along with an HSDPA, another UL resource assignment channel for the EU could be introduced on top of an existing HS-SCCH for an HSDPA. Thus, it is possible to introduce a separate set of SF=128 DL channels as UL resource assignment channels. With this approach, a WTRU would be required to monitor one or more UL resource assignment channels in addition to the HS-SCCHs for an HSDPA operation. Although this approach is conceptually simple, there are many disadvantages with this scheme, such as WTRU complexity, WTRU battery efficiency, and DL spreading code usage.

[0012] Therefore, an efficient EU channel assignment scheme is necessary for supporting both an EU and an HSDPA operation.

[0013] SUMMARY

[0014] In one embodiment, the present invention is a method and wireless

communication system for providing channel assignment information for supporting a UL channel and a DL channel. The system includes at least one Node-B and at least one WTRU. The WTRU communicates with the Node-B via a common control channel, the UL channel and the DL channel. The WTRU receives a message from the Node-B via the common control channel. The message includes an indication of whether the message is intended for assigning radio resources to the UL channel or the DL channel. The WTRU determines whether the message is intended for the WTRU and, if so, the WTRU determines whether the message is for assigning radio resources to the UL channel or the DL channel. The WTRU takes an appropriate action based on whether the message is for assigning radio resources to the UL channel or the DL channel.

[0015] In another embodiment, the present invention is a method and time-slotted wireless communication system. The system includes at least one Node-B, a radio network controller (RNC) which controls the Node-B, and at least one WTRU which communicates with the Node-B via a common control channel, a UL channel and a DL channel. The RNC transmits a message to the WTRU indicating which time slot TTIs support UL channel transmissions and which time slot TTIs support DL channel transmissions.

[0016] BRIEF DESCRIPTION OF THE DRAWINGS

[0017] A more detailed understanding of the invention may be had from the following description of a preferred example, given by way of example and to be understood in conjunction with the accompanying drawing wherein:

[0018] Figure 1 is a block diagram of a wireless communication system operating in accordance with the present invention;

[0019] Figure 2 is a look-up table for channelization code set mapping in an HSDPA, which is utilized in conjunction with the system of Figure 1; and

[0020] Figure 3 is a flowchart of a process including method steps for implementing uplink channel assignment signaling in accordance with the present invention.

[0021] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] The present invention will be described with reference to the drawing figures wherein like numerals represent like elements throughout.

[0023] Hereafter, the terminology "WTRU" includes but is not limited to a user equipment, a mobile station, a fixed or mobile subscriber unit, a pager, or any other type of device capable of operating in a wireless environment. When referred to hereafter, the terminology "Node-B" includes but is not limited to a base station, a site controller, an access point or any other type of interfacing device in a wireless environment.

[0024] The present invention is applicable to any type of wireless communication systems such as UMTS-time division duplex (TDD) and FDD, time division synchronous code division multiple access (TDSCDMA), code division multiple access 2000 (CDMA 2000), and CDMA in general or any other type of wireless communication system.

[0025] The features of the present invention may be incorporated into an integrated circuit (IC) or be configured in a circuit comprising a multitude of interconnecting components.

[0026] The present invention will be described in reference to an HSDPA and an EU, and the terms HSDPA and EU are used interchangeably with DL and UL, respectively. However, it should be understood that the reference to an HSDPA and an EU is just for describing the preferred embodiment of the present invention, and the teachings of the present invention may be applied to any system for utilizing a common control channel for transmitting channel assignment information for both UL and DL transmissions simultaneously.

[0027] Figure 1 is a block diagram of a system 100 for supporting UL and DL operations in accordance with the present invention. The system 100 includes an RNC 102, a Node-B 104, and a WTRU 106. The Node-B 104 is controlled by the RNC 102, and dynamically allocates radio resources for both UL and DL transmissions from and to the WTRU 106. Three channels are established between the Node-B 104 and the WTRU 106. The channels are a DL channel 108, a UL channel 110, and a common

control channel 112. The common control channel 112 is utilized for transmission of channel assignment information for both UL and DL transmissions.

[0028] The Node-B 104 is configured to support an HSDPA and EU operation. Therefore, each Node-B 104 dynamically allocates radio resources for DL and UL transmissions to and from the WTRU 106 through an HS-DSCH and an EU channel, respectively. The radio resources assignment information for both the HS-DSCH and the EU is transmitted through the common control channel 112.

[0029] In accordance with the present invention, the common control channel 112 is utilized for the transmission of radio resources assignment information for both UL and DL transmissions and a specific indication is provided to distinguish whether the radio resource assignment is for either UL or DL transmission. Therefore, the common control channel 112 occupies a shared DL radio resource space, as defined by a set of SF=128 channelization codes, for both DL and UL transmissions simultaneously, and the WTRU 106 is configured to recognize whether a particular transmission is intended for assigning radio resources for the DL or the UL transmissions.

[0030] In accordance with a first embodiment of the present invention, an indication that a particular radio resource is assigned for a UL transmission is provided by means of one or more of the impossible combinations in the channelization code set mapping in a current HSDPA. Figure 2 is a look-up table for channelization code set mapping currently used in the HSDPA. An HS-SCCH uses seven (7) bits to inform the WTRU 106 which SF=16 channelization codes are used for the corresponding HS-DSCH. Out of the 128 possible combinations, eight (8) combinations are not currently used in an HSDPA (see the labeled "redundant area" in Figure 2). One or more of the eight (8) unused combinations is used for assigning radio resources or indicating that the demodulated transmission is for UL transmission, not DL transmission. Therefore, if the WTRU 106 determines that a channelization-code-set corresponds to one of the impossible combinations of Figure 2, the WTRU 106 recognizes that the transmission is for assignment of radio resources for UL transmission, rather than DL transmission, or that the codes corresponding to the channelization-code-set are assigned to UL transmissions.

[0031] In accordance with a second embodiment of the present invention, an indication that a particular radio resource is assigned for UL transmission is provided by means of a WTRU-specific CRC. Under current HSDPA specifications, a WTRU-specific CRC is contained in an HS-SCCH field 2. A 16-bit CRC is computed from the information to be transmitted, and the computed CRC is masked with a unique 16-bit WTRU identity (ID). The masked CRC is transmitted to a WTRU 106 as a WTRU-specific CRC.

[0032] In accordance with the second embodiment of the present invention, this WTRU-specific CRC is modified in a unique and deterministic way to indicate that the demodulated transmission is for UL transmission, rather than DL transmission. For example, a WTRU-specific CRC computed for an HSDPA is inverted for an EU before performing a channel coding. A WTRU 106 performs two (2) different comparisons, preferably simultaneously, in performing a CRC of the received transmission. If the WTRU 106 succeeds in decoding the received transmission with a WTRU-specific CRC, the WTRU 106 recognizes that the transmission is intended for an HSDPA, and if the WTRU 106 succeeds in decoding the received transmission with an inverted WTRU-specific CRC, the WTRU 106 recognizes that the transmission is intended for an EU.

[0033] In accordance with a third embodiment of the present invention, an indication that a particular radio resource is assigned for an EU is provided by means of a WTRU-specific masking sequence. Under current HSDPA specifications, a 40-bit sequence of field 1 is masked with a 40-bit WTRU-specific intermediate code sequence which is generated from a 16-bit WTRU ID.

[0034] In accordance with the third embodiment, the WTRU-specific masking on field 1 is modified in a unique and deterministic way to indicate that a transmission is intended for an EU, not for an HSDPA. For example, the inverted 16-bit CRC generated in the second embodiment may be used to derive the 40-bit long masking sequence. If the WTRU 106 succeeds in decoding the received transmission with a WTRU-specific masking sequence, the WTRU 106 recognizes that the transmission is intended for an HSDPA, and if the WTRU 106 succeeds in decoding the received transmission with an inverted WTRU-specific masking sequence, the WTRU 106

recognizes that the transmission is intended for an EU.

[0035] With this method, the WTRU 106 can make the distinction whether an EU or an HSDPA channel assignment has been transmitted after having received only field 1 of the HS-SCCH transmission.

[0036] Alternatively, WTRU IDs are allocated by the network in such a way that a particular WTRU ID does not collide with another WTRU ID. For example, a first WTRU's inverted ID for EU may be used to indicate a second WTRU's HSDPA service. Therefore, simultaneous detection of presence of a UL resource assignment channel and an HS-SCCH is facilitated.

[0037] In accordance with a fourth embodiment of the present invention, an indication that a particular radio resource is assigned for an EU is provided by means of radio resource control (RRC) context signaling. Preferably, a Node-B 104 allocates separate radio resources for transmission of UL radio resources assignment and DL radio resources assignment. Alternatively, an RNC 102 allocates separate radio resources for transmission of UL radio resources assignment and DL radio resources assignment by using RRC signaling messages.

[0038] For example, an RRC signaling message from the RNC 102 may inform a WTRU 106 in which TTIs to expect an HS-SCCH or a UL resource assignment channel. Under current R5 HSDPA specifications, fifteen (15) time slots include one (1) frame, and three (3) time slots include one (1) TTI. "Even" TTIs may include, for example, time slots 2, 4, 6, 8, 10, 12 and 14, and "odd" TTIs may include, for example, time slots 1, 3, 5, 7, 9, 11, 13 and 15.

[0039] In accordance with the present invention, an RRC transmits signals indicating that a transmission in "even" TTIs is for an HS-SCCH and a transmission in "odd" TTIs is for a UL resource assignment channel. By not allowing a transmission for an HS-SCCH to be transmitted in "odd" TTIs, backwards compatibility with R5 WTRUs can be ensured. The same set of SF=128 resources can be used for an HS-SCCH and a UL resource assignment channel.

[0040] In accordance with a fifth embodiment of the present invention, an indication that a particular radio resource is assigned for an EU is provided by means

of layer 1 indication on an associated DL dedicated channel (DCH). One or more bits on the associated DL DCH are used to indicate imminent occurrence of a UL resource assignment channel as opposed to an HS-SCCH by means of a fixed and pre-determined timing relationship.

[0041] Figure 3 is a flowchart of a process 200 including method steps for implementing UL channel assignment signaling in accordance with the present invention. After the process 200 is initiated (step 202), a message for radio resource assignment is transmitted via a common control channel from a Node-B 104 to a WTRU 106. The WTRU 106 receives and demodulates the message using predetermined codes every predetermined TTI, for example, every 2 ms (step 204). The WTRU 106 then determines if the message is intended for the WTRU 106 (step 206). A WTRU-specific CRC may be utilized for this purpose. If the WTRU 106 determines that the message is intended for the WTRU 106, the WTRU 106 determines whether the message is for the assignment of radio resources for DL transmission or UL transmission implementing one of the embodiments of the present invention described above (step 208). The WTRU 106 then takes appropriate actions (step 210) depending on the decision in step 208 to receive or transmit data packet via DL or UL channels. For example, the WTRU 106 may recognize exactly when to initialize a data reception procedure via the DL channel 108 or when to initialize a data transmission procedure via the UL channel 110. Currently, an HS-SCCH for an HSDPA announces an incoming data packet for the WTRU with a fixed two (2) slot offset, whereas the present invention can inform the WTRU when it has an opportunity to transmit a packet via the UL, (e.g., four slots from now).

[0042] While this invention has been particularly shown and described with reference to preferred embodiments, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the invention described hereinabove.

* * *

CLAIMS

What is claimed is:

1. In a wireless communication system including at least one Node-B and at least one wireless transmit/receive unit (WTRU), a method for providing channel assignment information used to support an uplink (UL) channel and a downlink (DL) channel, the information being transmitted from the Node-B to the wireless transmit/receive unit (WTRU) via a common control channel, the method comprising:

(a) the WTRU receiving a message from the Node-B via the common control channel, the message including an indication of whether the message is intended for assigning radio resources to the UL channel or the DL channel;

(b) the WTRU determining whether the message is intended for the WTRU;

(c) the WTRU determining whether the message is for assigning radio resources to the UL channel or the DL channel; and

(d) the WTRU taking an appropriate action based on the determination of step (c).

2. The method of claim 1 wherein the appropriate action includes the WTRU initializing a data reception procedure via the DL channel.

3. The method of claim 1 wherein the appropriate action includes the WTRU initializing a data transmission procedure via the UL channel.

4. The method of claim 1 wherein the indication is a utilization of a set of mapping combinations for channelization codes for the UL channel or the DL channel.

5. The method of claim 1 wherein the indication is a utilization of a WTRU-specific cyclic redundancy check (CRC) for the UL channel or the DL channel.

6. The method of claim 5 wherein the WTRU-specific CRC for the UL channel is an inverted version of a WTRU-specific CRC for the DL channel.

7. The method of claim 5 wherein a WTRU-specific CRC is generated using an identification (ID) assigned to the WTRU.

8. A wireless communication system for providing channel assignment information used to support an uplink (UL) channel and a downlink (DL) channel, the system comprising:

(a) at least one Node-B; and

(b) at least one wireless transmit/receive unit (WTRU) in communication with the Node-B via a common control channel, the UL channel and the DL channel, wherein:

(i) the WTRU receives a message from the Node-B via the common control channel, the message including an indication of whether the message is intended for assigning radio resources to the UL channel or the DL channel;

(ii) the WTRU determines whether the message is intended for the WTRU;

(iii) the WTRU determines whether the message is for assigning radio resources to the UL channel or the DL channel; and

(iv) the WTRU takes an appropriate action based on whether the message is for assigning radio resources to the UL channel or the DL channel.

9. The system of claim 8 wherein the appropriate action includes the WTRU initializing a data reception procedure via the DL channel.

10. The system of claim 8 wherein the appropriate action includes the WTRU initializing a data transmission procedure via the UL channel.

11. The system of claim 8 wherein the indication is a utilization of a set of mapping combinations for channelization codes for the UL channel or the DL channel.

12. The system of claim 8 wherein the indication is a utilization of a WTRU-specific cyclic redundancy check (CRC) for the UL channel or the DL channel.

13. The system of claim 12 wherein the WTRU-specific CRC for the UL channel is an inverted version of a WTRU-specific CRC for the DL channel.

14. The system of claim 12 wherein a WTRU-specific CRC is generated using an identification (ID) assigned to the WTRU.

15. A wireless transmit/receive unit (WTRU) comprising:

(a) means for receiving a message including an indication of whether the message is intended for assigning radio resources to an uplink (UL) channel or a downlink (DL) channel;

(b) means for determining whether the message is intended for the WTRU;

(c) means for determining whether the message is for assigning radio resources to the UL channel or the DL channel; and

(d) means for taking an appropriate action based on whether the message is for assigning radio resources to the UL channel or the DL channel.

16. The WTRU of claim 15 wherein the appropriate action includes the WTRU initializing a data reception procedure via the DL channel.

17. The WTRU of claim 15 wherein the appropriate action includes the WTRU initializing a data transmission procedure via the UL channel.

18. The WTRU of claim 15 wherein the indication is a utilization of a set of mapping combinations for channelization codes for the UL channel or the DL channel.

19. The WTRU of claim 15 wherein the indication is a utilization of a WTRU-specific cyclic redundancy check (CRC) for the UL channel or the DL channel.

20. The WTRU of claim 19 wherein the WTRU-specific CRC for the UL channel is an inverted version of a WTRU-specific CRC for the DL channel.

21. The WTRU of claim 19 wherein a WTRU-specific CRC is generated using an identification (ID) assigned to the WTRU.

22. An integrated circuit (IC) comprising:

(a) means for receiving a message including an indication of whether the message is intended for assigning radio resources to an uplink (UL) channel or a downlink (DL) channel;

(b) means for determining whether the message is received at its intended destination;

(c) means for determining whether the message is for assigning radio resources to the UL channel or the DL channel; and

(d) means for taking an appropriate action based on whether the message is for assigning radio resources to the UL channel or the DL channel.

23. The IC of claim 22 wherein the appropriate action includes initializing a data reception procedure via the DL channel.

24. The IC of claim 22 wherein the appropriate action includes initializing a data transmission procedure via the UL channel.

25. The IC of claim 22 wherein the indication is a utilization of a set of mapping combinations for channelization codes for the UL channel or the DL channel.

26. The IC of claim 25 wherein the indication is a utilization of a WTRU-specific cyclic redundancy check (CRC) for the UL channel or the DL channel.

27. The IC of claim 26 wherein the WTRU-specific CRC for the UL channel is an inverted version of a WTRU-specific CRC for the DL channel.

28. The IC of claim 26 wherein a WTRU-specific CRC is generated using an identification (ID) assigned to the WTRU.

29. A time-slotted wireless communication system for providing channel assignment information, the system comprising:

(a) at least one Node-B;

(b) a radio network controller (RNC) which controls the Node-B; and

(c) at least one wireless transmit/receive unit (WTRU) which communicates with the Node-B via a common control channel, an uplink (UL) channel and a downlink (DL) channel, wherein the RNC transmits a message to the WTRU indicating which time slot transmission time intervals (TTIs) support UL channel transmissions and which time slot TTIs support DL channel transmissions.

30. The system of claim 29 wherein the system is a frequency division duplex (FDD) system.

31. The system of claim 29 wherein the message comprises radio resource control (RRC) context signaling.

32. The system for claim 29 wherein a high speed shared control channel (HS-SCCH) is transmitted in the TTIs that support the DL channel.

33. The system for claim 29 wherein a UL resource assignment channel is transmitted in the TTIs that support the UL channel.

34. The system for claim 29 wherein the WTRU determines whether the message is for assigning radio resources for DL transmission or UL transmission.

35. In a time-slotted wireless communication system including at least one Node-B in communication, a radio network controller (RNC) which controls the Node-B, and at least one wireless transmit/receive unit (WTRU) which communicates with the Node-B via a common control channel, an uplink (UL) channel and a downlink (DL) channel, a method comprising:

the RNC transmitting a message to the WTRU indicating which time slot transmission time intervals (TTIs) support UL channel transmissions and which time slot TTIs support DL channel transmissions.

36. The method of claim 35 wherein the system is a frequency division duplex (FDD) system.

37. The method of claim 35 wherein the message comprises radio resource control (RRC) context signaling.

38. The method for claim 35 further comprising transmitting a high speed shared control channel (HS-SCCH) in the TTIs that support the DL channel.

39. The method for claim 35 further comprising transmitting a UL resource assignment channel in the TTIs that support the UL channel.

40. The method for claim 35 further comprising the WTRU determining whether the message is for assigning radio resources for DL transmission or UL transmission.

ABSTRACT

A method and wireless communication system for providing channel assignment information used to support an uplink (UL) channel and a downlink (DL) channel. The system includes at least one Node-B and at least one wireless transmit/receive unit (WTRU). The WTRU communicates with the Node-B via a common control channel, the UL channel and the DL channel. The WTRU receives a message from the Node-B via the common control channel. The message includes an indication of whether the message is intended for assigning radio resources to the UL channel or the DL channel. The WTRU determines whether the message is intended for the WTRU and, if so, the WTRU determines whether the message is for assigning radio resources to the UL channel or the DL channel. The WTRU takes an appropriate action based on whether the message is for assigning radio resources to the UL channel or the DL channel.

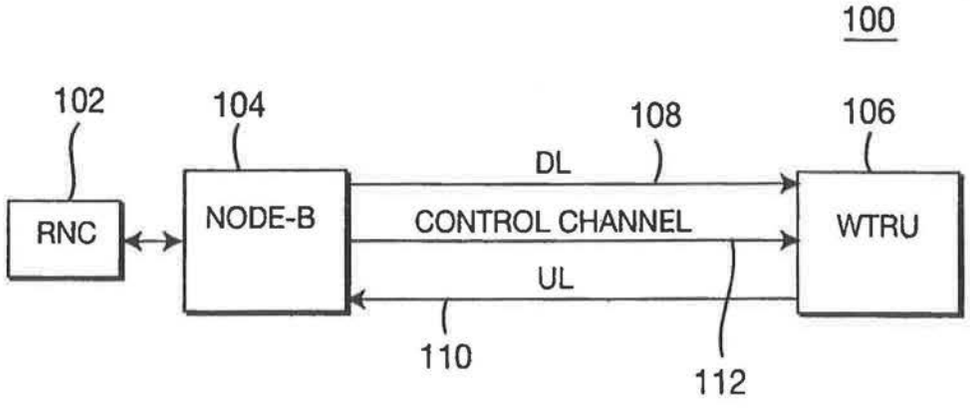
100
102
104
108
106
DL
RNC
NODE-B
CONTROL CHANNEL
WTRU
UL
110
112

FIG. 1

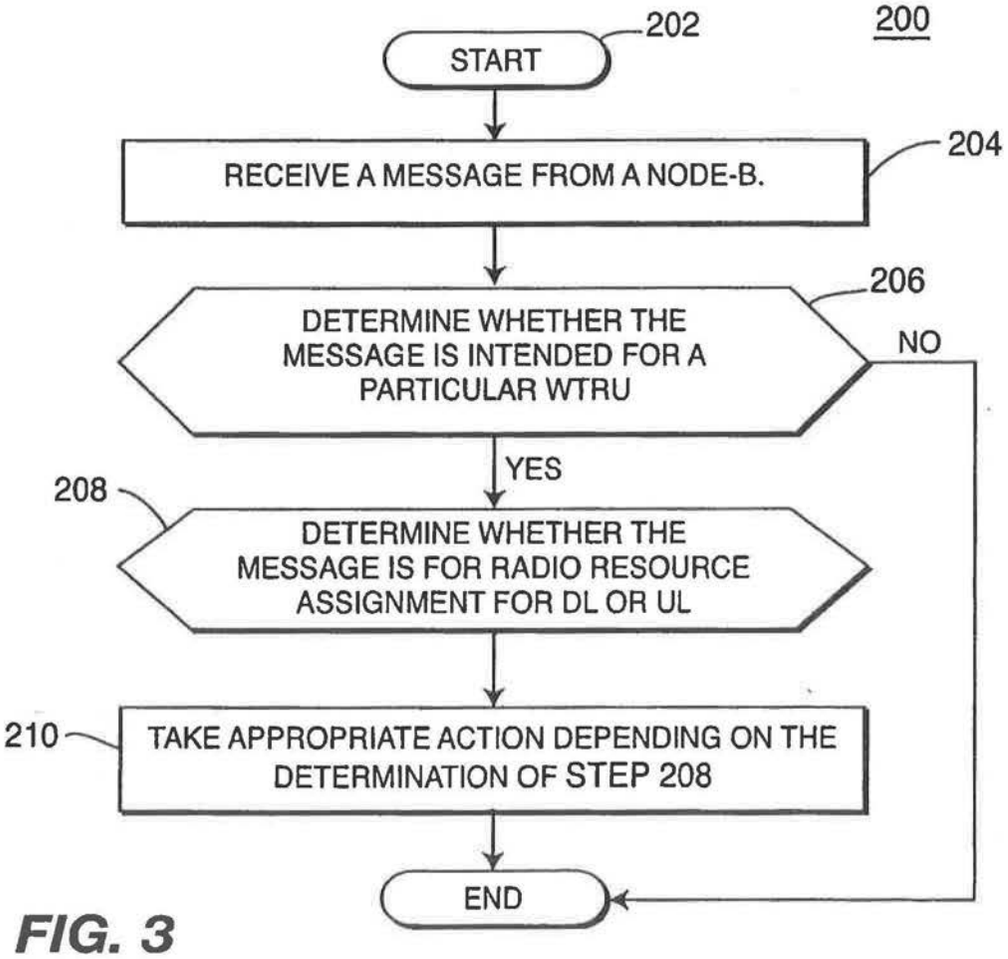
200
202
START
RECEIVE A MESSAGE FROM A NODE-B.
204
DETERMINE WHETHER THE MESSAGE IS INTENDED FOR A PARTICULAR WTRU
206
NO
YES
208
DETERMINE WHETHER THE MESSAGE IS FOR RADIO RESOURCE ASSIGNMENT FOR DL OR UL
210
TAKE APPROPRIATE ACTION DEPENDING ON THE DETERMINATION OF STEP 208
END

FIG. 3

TREE OFFSET INDICATOR (4 BITS)

CLUSTER CODE INDICATOR (3 BITS)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0 (1/15)	1 1	1 2	1 3	1 4	1 5	1 6	1 7	1 8	1 9	1 10	1 11	1 12	1 13	1 14	1 15	15 1
1 (2/14)	2 1	2 2	2 3	2 4	2 5	2 6	2 7	2 8	2 9	2 10	2 11	2 12	2 13	2 14	14 2	14 1
2 (3/13)	3 1	3 2	3 3	3 4	3 5	3 6	3 7	3 8	3 9	3 10	3 11	3 12	3 13	13 3	13 2	13 1
3 (4/12)	4 1	4 2	4 3	4 4	4 5	4 6	4 7	4 8	4 9	4 10	4 11	4 12	12 4	12 3	12 2	12 1
4 (5/11)	5 1	5 2	5 3	5 4	5 5	5 6	5 7	5 8	5 9	5 10	5 11	11 5	11 4	11 3	11 2	11 1
5 (6/10)	6 1	6 2	6 3	6 4	6 5	6 6	6 7	6 8	6 9	6 10	10 6	10 5	10 4	10 3	10 2	10 1
6 (7/9)	7 1	7 2	7 3	7 4	7 5	7 6	7 7	7 8	7 9	9 7	9 6	9 5	9 4	9 3	9 2	9 1
7 (8/8)	REDUNDANT AREA								8 8	8 7	8 6	8 5	8 4	8 3	8 2	8 1

DECODING NOTATION

m — NUMBER OF MULTI-CODES

Δ — OFFSET FROM LEFT/RIGHT IN CODE TREE (SF=16)

FIG. 2

Express Mail Label No. EV396083784US

APPLICATION DATA SHEET
UNDER 37 CFR §1.76

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Telephone No.::	215-568-6400

(4) Application Information

Title Line One::	METHOD AND SYSTEM FOR PROVIDING
Title Line Two::	CHANNEL ASSIGNMENT INFORMATION USED
Title Line Three::	TO SUPPORT UPLINK AND DOWNLINK
Title Line Four::	CHANNELS
Total Drawing Sheets::	2
Drawing Type::	Formal
Application Type::	Utility
Docket No.::	I-2-0541.1US

(5) Representative Information

Representative Customer No.:: 24374

(6) Domestic Priority Information

This application is a::	Non Prov. of Provisional
>Application One::	60/523,049
Filing Date::	November 18, 2003

1/8, 15, 22, 29, 35,

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2003

Application or Docket Number
09027740

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	40	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	40 minus 20=	* 20
INDEPENDENT CLAIMS	6 minus 3 =	* 3
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	385.00	OR	BASIC FEE	770.00
XS 9=		OR	XS18=	360
X43=		OR	X86=	258
+145=		OR	+290=	
TOTAL		OR	TOTAL	1388

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

08/03/2004 DTESSEM1 00000055 090435 10902740

01 FC:1001 770.00 DA
02 FC:1202 360.00 DA
03 FC:1201 258.00 DA

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 469-267/69033

EXHIBIT O

3GPPRAN1#29 **Tdoc# R1-02-1350**
Shanghai, China
November 5th-8th, 2002

Agenda Item: Design Considerations for Enhanced Uplink Dedicated Channel
Source: **Motorola**
Title: **Details**
Document for: **Discussion**

Introduction

In this contribution, some options for the design of Enhanced Uplink Dedicated Transport Channel and its associated control channels are discussed.

Considerations for the design of Enhanced Uplink Dedicated Transport Channel (EUDTC)

Several enhancements for packet data services for uplink using dedicated transport channels so that the system could support higher peak rates while maximizing the capacity and coverage of the system using a new uplink channel called Enhanced Uplink Dedicated Transport Channel (EUDTC) were discussed in [1]. The following enhancements were proposed :

1. Adaptive modulation and coding (BPSK, QPSK and possibly 8-PSK)
2. Hybrid ARQ (both IR and Chase)
3. Node-B based scheduling
4. Efficient associated control channels
5. Fast DCH setup and lower end-to-end delay

Figure 1 shows one of the possible structures for the EUDTCH and its associated uplink and downlink control channels including the message flow diagram to support the above mentioned features. The UE communicates scheduling information to the Node-B's using a uplink scheduling information control channel with a known fixed modulation and coding rate and transport block size as shown in Figure 1. The corresponding code assignment for the reverse link scheduling information control channel is done on a semi-static basis. It may be noted that the UE does not transmit control information if its corresponding data queue is empty. Using the available scheduling information from all UEs each serving Node-B schedules one or more of the UEs for each scheduling transmission interval. As an example, the scheduling transmission interval may be 10ms while the UE transmits on 2ms sub-frames (or perhaps instead 3.33ms sub-frames) on the reverse link TFRI control channel and the EUDCH in order to reduce signaling and therefore reduce signaling interference overhead. That is, by having the 10ms scheduling transmission interval broken up into five 2ms sub-frames the UE can still optimize the rate (TFRI) based on the most current channel conditions while at the same time minimizing control channel

interference by allowing some control information to be sent at 10ms intervals instead of 2ms sub-frame intervals.

Each Node-B then uses reverse link interference level, UE scheduling information, and power control information to determine each UE's maximum allowed power margin target. Power margin is defined as the difference between the current DPCCH power level and the maximum power level supported by the UE. An active set Node-B chooses a UE to be scheduled and then sends a scheduling assignment on a downlink scheduling assignment control channel to the chosen UE. The scheduling assignment may consist of the maximum allowed 'power margin' target (note: this is equivalent to specifying a maximum data transmission rate), a map of the allowed EUDCH sub-frame (2ms e.g.) transmission intervals for the next 10ms transmission interval[1].

A UE in a SHO region may receive one or more scheduling assignments from one or more active set (serving) Node-B's and subsequently chooses the scheduling assignment corresponding to the best TFRI. For each EUDCH sub-frame the UE determines the TFRI based on the interference information (maximum allowed power margin) from the selected scheduling assignment and the current scheduling information measured at the UE (i.e. current data queue and power status or power margin). It may be noted that the fast power control function is enabled and the feedback rate is performed on a slot-by-slot basis. The UE transmits the EUDCH sub-frame using the selected TFRI. The TFRI may be sent on a uplink TFRI control channel using a 2ms/3.33ms frame interval (i.e. sub-frame interval) or alternatively could be sent on the EUDCH with a known fixed MCS either by puncturing the data bits or as a preamble or midamble.

A EUDCH sub-frame of data for a given H-ARQ channel is demodulated and decoded. The resulting EUDCH soft decision information is combined and stored in the serving NodeB's HARQ buffer along with previous and subsequent transmissions until the sub-frame successfully decodes at which time an ACK is signaled to the UE on the downlink Ack/Nack control channel. Otherwise a NACK is signaled to the UE on a downlink Ack/Nack control channel. When a UE receives an ACK from any serving Node-B it sets the new data indicator bit in the next uplink TFRI message sent on the uplink TFRI control channel which is interpreted as a HARQ flush command by each active set Node-B's for the corresponding HARQ channel. That is, the HARQ buffer at the serving Node-B's for the corresponding current HARQ channel of UE is flushed and is then filled with the soft decision information of the new EUDCH transmission. It may be noted that the Ack/Nack information may also be piggybacked on the HS-SCCH using a new frame format for the HS-SCCH.

When the UE is in a soft-handoff region such that it has more than one Node-B's in its active set it must monitor downlink scheduling assignment and downlink Ack/Nack control channels from at least one of

[1] Note that if it was decided not to let the mobile determine the actual TFRI used for each sub-frame then the downlink control channel information could include the TFRI for each sub-frame although this would be very sub-optimal.

the active set (serving) Node-B's. The downlink control channels the UE has to monitor may include a DPDCH/DPCCH or associated DPCH, the control channels corresponding to HS-DSCH (HS-SCCH) and downlink scheduling assignment and downlink Ack/Nack control channels corresponding to EUDCH transmission.

Figure 2 shows the uplink structure for the above configuration[2]. The PAR for this configuration is currently under investigation.

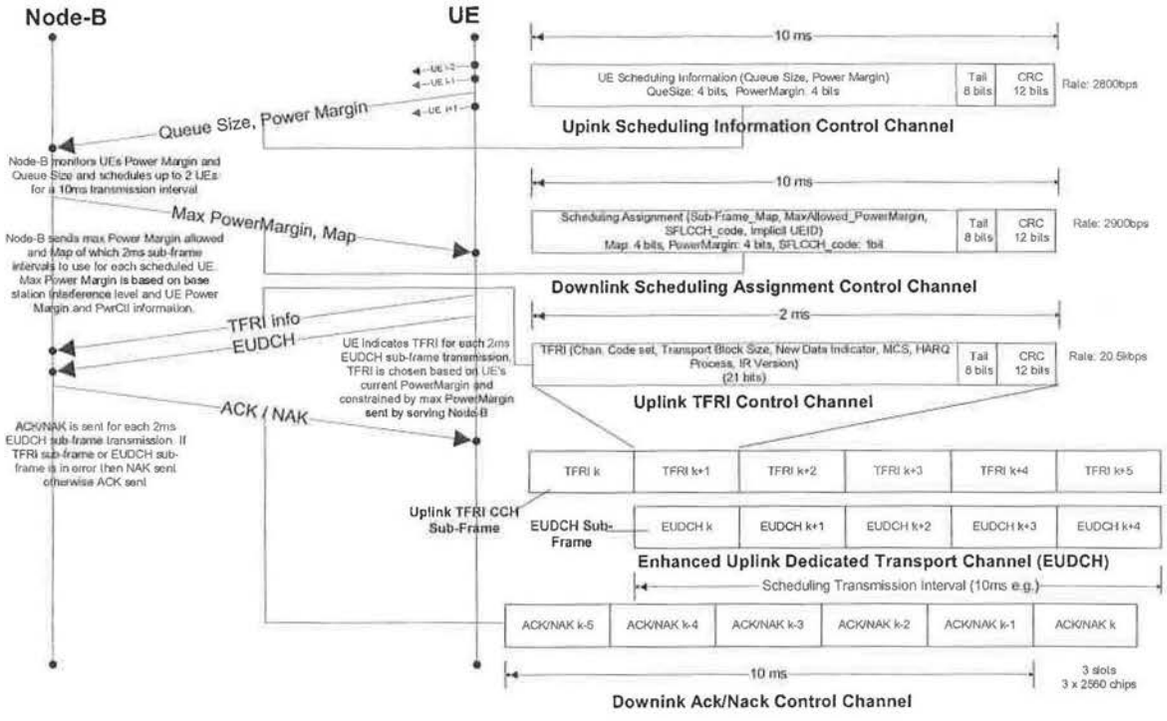

Figure 1. Structure of EUDTCH and its associated control channels with flow diagram

[2] It may be noted that the scheduling information control channel and the TFRI control channel could share the same DPDCH/DPCCH.

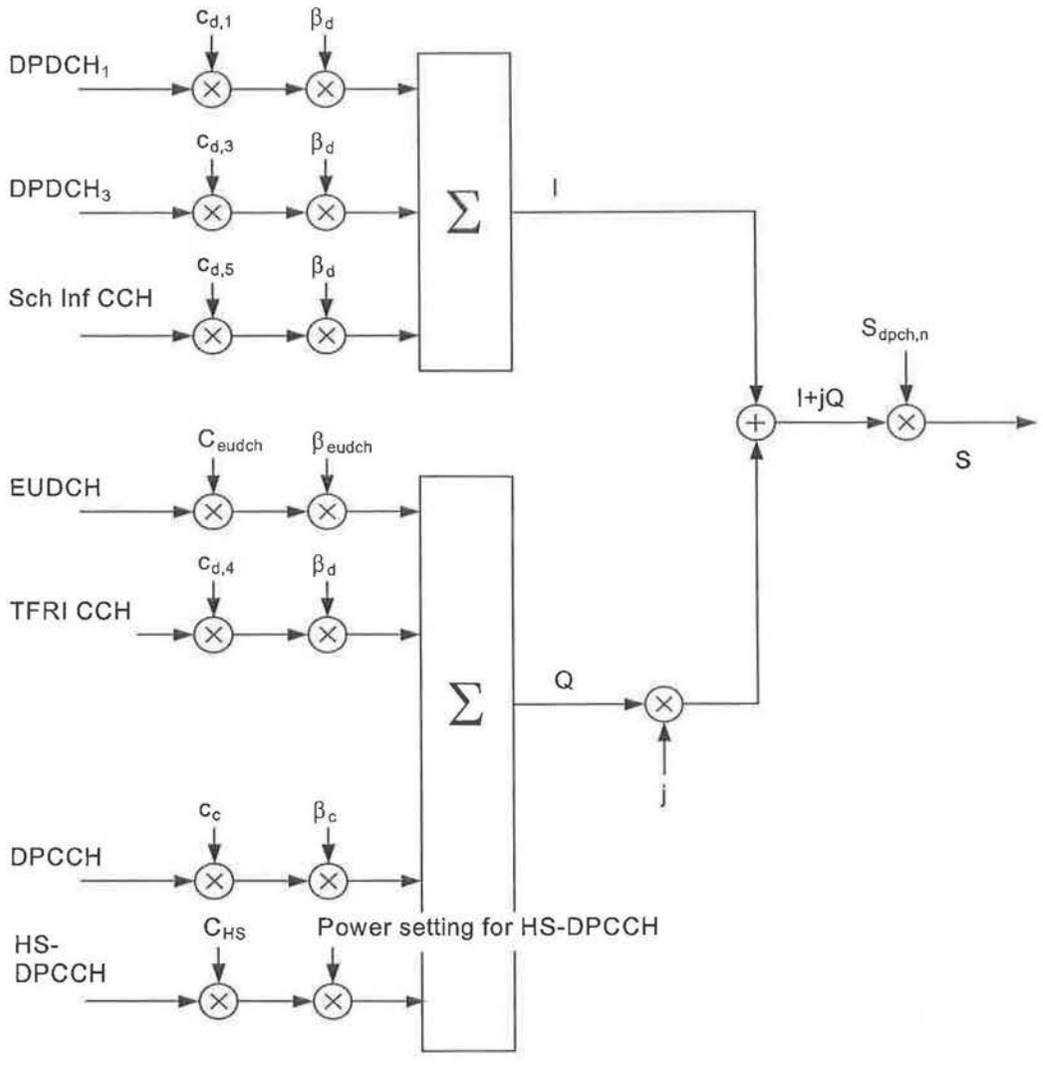

Figure 2. Spreading for uplink DPCCH , DPDCHs, and EUDCH and its associated control channels

Conclusion:

A possible structure for EUDTCH and its associated control channels are proposed. With this structure the EUDTCH can support the features proposed in the study item description while at the same time reducing interference in the uplink. It is recommended that this scheme be included in the TR and further simulation studies be done with the proposed scheme.

References

[1] Motorola, R1-02-1250, "Uplink Enhancements for Dedicated Transport Channels".

[2] R1-02-1259, "3GPP Draft TR on Feasibility Study for Enhanced Uplink for UTRA FDD".

[3] R1-02-1219, Nokia, "Uplink enhancements for Dedicated Transport Channels", RAN1#28bis, Oct. 8, 2002.

[4] R1-02-1225, Ericsson, "Techniques for Uplink Enhancments for Dedicated Transport Channels", RAN1#28bis, Oct. 8, 2002

[5] R1-02-1244, Lucent, "Uplink Enhancements for Dedicated Transport Channels – Concepts and Fundamentals", RAN1#28bis, , Oct. 8, 2002

[6] R1-02-1237, Qualcomm, "UL Enhancements High Level Considerations", RAN1#28bis,, Oct. 8, 2002

CERTIFICATE OF SERVICE

I, Susan Damron, certify that a copy of the foregoing **RESPONSE OF ZTE CORPORATION AND ZTE (USA) TO THE COMPLAINT OF INTERDIGITAL COMMUNICATIONS, LLC UNDER SECTION 337 OF THE TARIFF ACT OF 1930, AS AMENDED, AND NOTICE OF INVESTIGATION** was served as indicated to the parties listed below on this 22nd day of February, 2013.

The Honorable Lisa R. Barton Acting Secretary U.S. International Trade Commission 500 E Street, S.W., Room 112-A Washington, D.C. 20436	( ) Via First Class Mail ( ) Via Federal Express ( ) Via Hand Delivery ( ) Via Facsimile (X) Via Electronic Filing
The Honorable Robert K. Rogers Administrative Law Judge U.S. International Trade Commission 500 E Street, S.W., Room 317 Washington, D.C. 20436 (Two Copies)	( ) Via First Class Mail ( ) Via Federal Express (X) Via Hand Delivery ( ) Via Facsimile ( ) Via E-Mail
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