

033005
20427 U.S. PTO

PROVISIONAL APPLICATION FOR PATENT COVER SHEET
This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

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112975 U.S. PTO
60/666494
033005

INVENTORS					
Inventor Name			Residence (City and either State or Foreign Country)		
Brian K. Classon			Palatine, Illinois, United States		
Additional inventors are being named on the <u>2</u> separately numbered sheet attached hereto					
TITLE OF THE INVENTION (280 characters maximum)					
MULTIFRAME CONCEPT FOR ENHANCED UTRA (EUTRA)					
CORRESPONDENCE ADDRESS					
Direct all correspondence to:					
<input checked="" type="checkbox"/> Customer Number <u>22917</u>					
OR					
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Address					
City		State		Zip	
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Pages		Number of Pages <u>24</u>		<input type="checkbox"/> CD(s), Number	
<input checked="" type="checkbox"/> Drawings		Embedded in Specification		<input type="checkbox"/> Other (specify)	
<input checked="" type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.					
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees					
<input checked="" type="checkbox"/> The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 502117 . A Fee Transmittal in duplicate is attached.					Filing Fee Amount (\$)
					\$200.00
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.					
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input checked="" type="checkbox"/> No.					
<input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____					

Respectfully submitted,

Date March 30, 2005

SIGNATURE

TYPED or PRINTED NAME Kenneth A. Haas

REGISTRATION NO. 42,614

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(if appropriate)
Docket Number: CML02476M

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Effective on 12/08/2004

Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818)

FEE TRANSMITTAL
For FY 2005

Applicant claims small entity status. See 37 CFR 1.27

Complete if Known

Application Number	
Filing Date	March 30, 2005
First Named Inventor	Classon et al.
Examiner Name	
Group Art Unit	
Attorney Docket No.	CML02476M

TOTAL AMOUNT OF PAYMENT (\$)

METHOD OF PAYMENT (check all that apply)

Check Credit card Money Order None Other (please identify): _____

Deposit Account Deposit Account Number: **502117** Deposit Account Name: **MOTOROLA, INC.**

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

Charge fee(s) indicated below Charge fee(s) indicated below, **except for the filing fee**

Charge any additional fee(s) or underpayments of fee(s) Credit any overpayments

under 37 CFR 1.16 and 1.17

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	\$200.00

2. EXCESS CLAIM FEES

Fee Description	Fee(\$)	Small Entity Fee (\$)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims Extra Claims Fee (\$) = Fee Paid (\$) Multiple Dependent Claims

- 20 or HP= x = Fee(\$) Fee Paid (\$)

HP=highest number of total claims paid for, if greater than 20

Indep. Claims Extra Claims Fee (\$) = Fee Paid (\$)

- 3 or HP= x =

HP=highest number of independent claims paid for, if greater than 3

3. APPLICATION SIZE FEE:

If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$) Fee Paid (\$)

- 100 = /50 = (round up to a whole number) x =

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other: _____ Fee Paid (\$)

SUBMITTED BY

Complete (if applicable)

Name (Print/Type)	Kenneth A. Haas	Registration No.	42,614	Telephone	847-576-6937
Signature		Date	March 30, 2005		

Multiframe concept for Enhanced UTRA

Brian Classon, Kevin Baum, Bob Love, Ken Stewart, Vijay Nangia, Amitava Ghosh

Background

One of the key requirements for wireless broadband system development, such as in the 3GPP Long Term Evolution (LTE), is reducing latency in order to improve user experience. From a link layer perspective, the key contributing factor to latency is the round-trip delay between a packet transmission and an acknowledgment of the packet reception. The round-trip delay is typically defined as a number of frames, where a frame is the time duration upon which scheduling is performed. The round-trip delay itself determines the overall ARQ design, including design parameters such as the delay between a first and subsequent transmissions of a packet, or the number of hybrid ARQ channels (instances). A reduction in latency is therefore key in developing enhanced UTRA and UTRAN (also known as EUTRA and EUTRAN), with the focus on defining the optimum frame duration.

Unfortunately, no single frame duration is best for different traffic types requiring different QoS characteristics or offering differing packet sizes. This is especially true when the control channel and pilot overhead in a frame is considered. For example, if the absolute control channel overhead is constant per user per resource allocation and a single user is allocated per frame, a frame duration of 0.5ms would be roughly four times less efficient than a frame duration of 2ms. In addition, different frame durations could be preferred by different manufacturers or operators, making the development of an industry standard or compatible equipment difficult. Therefore, there is a need for an improved method for reducing both round-trip latency and overhead.

Detailed Description

Overview

A Radio Frame (RAF) and subframe are defined such that the RAF is divided into a number (an integer number in the preferred embodiment) of subframes. For example, a 10ms core RAF structure from UTRA may be defined, with N_{rf} subframes per radio frame (e.g., $N_{rf}=20$ $T_{sf}=0.5ms$ subframes, where T_{sf} =duration of one subframe). For OFDM transmission, subframes comprise an integer number P of OFDM symbol intervals (e.g., $P=10$ for $T_{sn}=50\mu s$ symbols, where T_{sn} =duration of one OFDM symbol), and one or more subframe types may be defined based on guard interval or cyclic prefix (e.g., normal or broadcast).

Within a RAF, frames are constructed from an integer number of subframes for data transmission, with two or more frame durations available (e.g., a first frame duration of one subframe, and a second frame duration of three subframes). The different frame durations may be used to reduce latency and overhead based on the type of traffic served. The radio frame structure may additionally be used to define common control channels for the DL (such as broadcast channel, paging channel, synchronization channel, indication channels) in a manner which is time-division multiplexed into the subframe

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sequence, which may simplify processing or increase battery life at the user equipment (UE). Similarly for UL, the radio frame structure may additionally be used to define contention channels (e.g. RACH), control channels including pilot time multiplexed with the shared data channel.

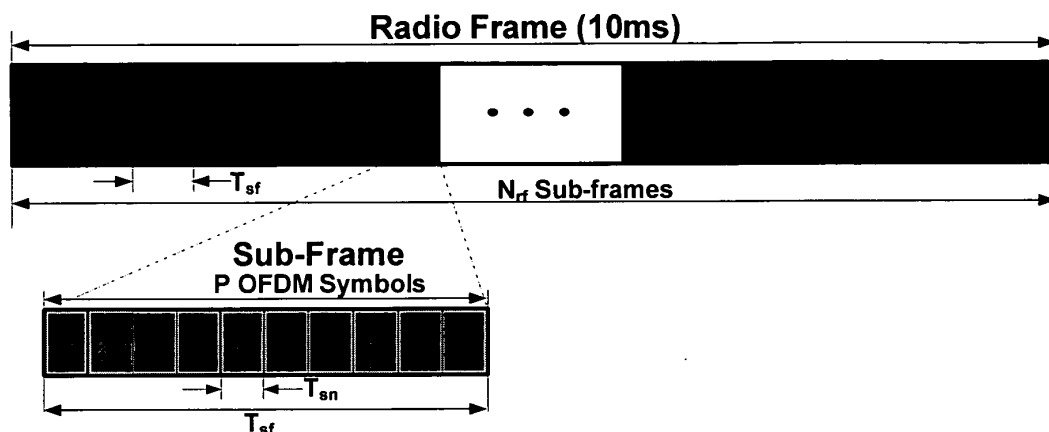


Figure 1 – Radio frame with $m=20$ subframes of duration 0.5ms consisting of $j=10$ symbols.

Data transmission is provided by:

- Receiving data to be transmitted over a radio frame, wherein the radio frame is comprised of a plurality of subframes wherein the duration of a subframe is substantially constant and the duration of the radio frame is constant;
- Selecting a frame duration from two or more frame durations, wherein the frame duration is substantially the subframe duration multiplied by a number;
- Based on the frame duration, grouping into a frame the number of subframes
- Placing the data within the subframes
- Transmitting the frame having the number of subframes over the radio frame.

The data transmission may be a downlink transmission or an uplink transmission. The transmission scheme may be OFDM with or without cyclic prefix or guard interval such as IOTA, or single carrier with or without cyclic prefix or guard interval (e.g., IFDMA, DFT-Spread-OFDM), CDM, or other.

The following sections provide details on:

- Frame durations
- Reasons for selecting a frame duration
- Subframe types
- Radio Frame Ancillary Function Multiplexing
- Framing Control

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