

ETSI/TC SMG
Released by : ETSI/PT 12
Release date: February 1992

RELEASE NOTE

Recommendation GSM 06.10

GSM Full Rate Speech Transcoding

Previously distributed version : 3.2.0 (Release 1/90)
New Released version February 92 : 3.2.0 (Release 92, Phase 1)

1. Reason for changes

No changes since the previously distributed version.

Notice: This material may be
protected by copyright law
(Title 17 U.S. Code).

RPX Exhibit 1112
RPX v. DAE

GSM recommendation: 06.10

Title: GSM full rate speech transcoding

Date: February 1992

List of contents: 1. General

- 2. Transmission characteristics
- 3. Functional description of the RPE-LTP codec
- 4. Computational details of the RPE-LTP codec
- 5. Digital test sequences
- Annex 1. Codec performance
- Annex 2. Subjective relevance of the speech
coder output bits
- Annex 3. Format for test sequence distribution

NOTE: This Recommendation is a reproduction of recommendation
T/L/03/11 "13 kbit/s Regular Pulse Excitation - Long Term
Prediction - Linear Predictive Coder for use in the
Pan-European Digital Mobile Radio System".

Floppy disks containing the digital test sequences described
in section 5 can be distributed by ETSI Secretariat on request.

ETSI/GSM

Version 3.2:0

The contact information of the ETSI secretariat is:

ETSI

B.P. 152

F 06561 Valbonne Cedex

France

Tel +33 92 94 42 00

Fax +33 93 65 47 16

Language of original: English

Number of pages: 93

Detailed list of contents

1. GENERAL

- 1.1. SCOPE
- 1.2. OUTLINE DESCRIPTION
- 1.3. FUNCTIONAL DESCRIPTION OF AUDIO PARTS
- 1.4. PCM FORMAT CONVERSION
- 1.5. PRINCIPLES OF THE RPE-LTP ENCODER
- 1.6. PRINCIPLES OF THE RPE-LTP DECODER
- 1.7. SEQUENCE AND SUBJECTIVE IMPORTANCE OF ENCODED PARAMETERS

2. TRANSMISSION CHARACTERISTICS

- 2.1. PERFORMANCE CHARACTERISTICS OF THE ANALOGUE/DIGITAL INTERFACES
- 2.2. TRANSCODER DELAY

3. FUNCTIONAL DESCRIPTION OF THE RPE-LTP CODEC

- 3.1. FUNCTIONAL DESCRIPTION OF THE RPE-LTP ENCODER
 - 3.1.1. Offset compensation
 - 3.1.2. Preemphasis
 - 3.1.3. Segmentation
 - 3.1.4. Autocorrelation
 - 3.1.5. Schur Recursion
 - 3.1.6. Transformation of reflection coefficients to Log.-Area Ratios
 - 3.1.7. Quantization and coding of Log.-Area Ratios
 - 3.1.8. Decoding of the quantized Log.-Area Ratios
 - 3.1.9. Interpolation of Log.-Area Ratios
 - 3.1.10. Transformation of Log.-Area Ratios into reflection coefficients
 - 3.1.11. Short term Analysis Filtering
 - 3.1.12. Sub-segmentation
 - 3.1.13. Calculation of the LTP parameters
 - 3.1.14. Coding/Decoding of the LTP lags
 - 3.1.15. Coding/Decoding of the LTP gains
 - 3.1.16. Long term analysis filtering
 - 3.1.17. Long term synthesis filtering
 - 3.1.18. Weighting Filter
 - 3.1.19. Adaptive sample rate decimation by RPE grid selection
 - 3.1.20. APCM quantization of the selected RPE sequence
 - 3.1.21. APCM inverse quantization
 - 3.1.22. RPE grid positioning

3.2. DECODER

- 3.2.1. RPE decoding section
- 3.2.2. Long Term Prediction section
- 3.2.3. Short term synthesis filtering section
- 3.2.4. Postprocessing

4. COMPUTATIONAL DETAILS OF THE RPE-LTP CODEC

- 4.1. DATA REPRESENTATION AND ARITHMETIC OPERATIONS
- 4.2. FIXED POINT IMPLEMENTATION OF THE RPE-LTP CODER

- 4.2.0. Scaling of the input variable
- 4.2.1. Downscaling of the input signal
- 4.2.2. Offset compensation
- 4.2.3. Preemphasis
- 4.2.4. Autocorrelation
- 4.2.5. Computation of the reflection coefficients
- 4.2.6. Transformation of reflection coefficients to Log.-Area Ratios
- 4.2.7. Quantization and coding of the Log.-Area Ratios
- 4.2.8. Decoding of the coded Log.-Area Ratios
- 4.2.9. Computation of the quantized reflection coefficients
 - 4.2.9.1. Interpolation of the LARpp[1..8] to get the LARp[1..8]
 - 4.2.9.2. Computation of the rp[1..8] from the interpolated LARp[1..8]
- 4.2.10. Short term analysis filtering
- 4.2.11. Calculation of the LTP parameters
- 4.2.12. Long term analysis filtering
- 4.2.13. Weighting filter
- 4.2.14. RPE grid selection
- 4.2.15. APCM quantization of the selected RPE sequence
- 4.2.16. APCM inverse quantization
- 4.2.17. RPE grid positioning
- 4.2.18. Update of the reconstructed short term residual signal
dp[-120..-1]

4.3. FIXED POINT IMPLEMENTATION OF THE RPE-LTP DECODER

- 4.3.1. RPE decoding section
- 4.3.2. Long term synthesis filtering
- 4.3.3. Computation of the decoded reflection coefficients
- 4.3.4. Short term synthesis filtering section
- 4.3.5. Deemphasis filtering
- 4.3.6. Upscaling of the output signal
- 4.3.7. Truncation of the output variable

4.4. TABLES USED IN THE FIXED POINT IMPLEMENTATION OF THE RPE-LTP CODER AND DECODER

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.