Technical Specification Group Services and System Aspects   *TSGS#5(99)371*

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Source:	**GSM/EDGE RAN Drafting Group (ETSI SMG2)**
Title:	**Draft of GSM/EDGE RAN Radio Requirements**
Document for:	**Information**
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                                                                       Agenda:

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Title: **Draft of GSM/EDGE RAN Radio Requirements**

Document for: Discussion

Introduction:

Tdoc 2-99-1197, which lists requirements for EGPRS phase II, has been discussed in detail in the GSM/EDGE RAN drafting group during SMG2 #32. There are a number of open issues still under discussion, and will continue to be discussed in the next EDGE Workshops. As a consequence, this is a "living document". Further, throughout the text, there will be issues raised, and questions highlighted, that are not yet defined.

It is recommended that Operator's scenarios for evolution road-maps and backward compatibility be discussed and taken into account in the GSM/EDGE RAN Radio Requirements (e.g. EGPRS Phase I, Compact, ECSD, etc.)

1. Background

The GSM/EDGE RAN is seen as one of the radio access technologies connected to the 3GPP Core Network. The GSM/EDGE RAN consists of several parts. The GSM/EDGE RAN should include support of real-time services, including voice, as part of radio access to the 3GPP Core Network for Release 2000. The achievement of these objectives would hasten the migration of GSM and ANSI-136 TDMA users to a common radio access network, making it possible to have a single global wireless standard.

Currently, 3GPP SA2 is investigating all-IP network architecture for Release 2000, and a technical report is expected in October 1999. It is anticipated that this will lead to work package definitions for several TSGs, and the work of SMG2 should be closely coordinated with the overall Release 2000 work plan as defined by SA2.

2. High Level Requirements

As discussed in the SMG2 plenary session the evolution of the GSM 200 kHz radio access shall be referred to as GSM/EDGE RAN.

The following high level requirements have been initially identified for the GSM/EDGE RAN in responsibility of SMG2:

- All bearer classes (conversational, streaming, interactive and background) as defined for UTRAN shall be provided

- The same quality of service handling and bearer service attributes shall be supported as required for UTRAN (as described in TS 22.105). Whether the same range of values of the service attributes as supported by UTRAN shall be supported by the GSM/EDGE RAN in Release 2000 is for further study

- Support for multiple QoS profiles in parallel (question to 3GPP CN concerning status for release 99) shall be provided in the GSM/EDGE RAN.

3. Bearer Definition

Radio Access Bearers

Specific requirements are expected from SA2.

Radio Bearers

Mapping of the radio access bearer onto the radio bearer is up to the RAN as long as the requested QoS service is achieved.

SMG2 may specify several radio bearers with different optimizations.

4. Services

Specific requirements are expected from SA2.

Voice

It is desired to have the GSM/EDGE RAN support Adaptive Multi-Rate (AMR) CODEC speech and Tandem Free Operation (TFO) services, and be consistent with S2 requirements. Further, voice services should be provided with quality and delay comparable to current digital cellular systems.

[Note: A discussion on the relation of TFO to the Transcoder (TRAU) position in the architecture highlighted the issue of how UTRAN deals with TFO. The following questions arose:

1. Clarification on how TFO is handled in UMTS (This is a question for 3GPP TSG S4))

2. What voice requirements will come from S2]

Other Services

TBD

5. Improved Data Rates & Throughput

It is desired to develop technical solutions to support higher peak data rates and higher throughput (than EGPRS Phase I) in order to support as many of the UMTS service attributes and their values as possible. It is expected that specific data rate requirements and other technical requirements for the different Radio Access Bearers (RAB) will depend on the RAB definitions, and should be developed together with S1 and S2.

6. Handover and cell re-selection

Specific requirements are expected from SA2.

For the optimized voice service, handover performance should be no worse than for GSM voice service. In particular, speech gap should be no more than 150 ms. [Verify it is a GSM requirement] Handover should also be supported for other real-time RAB with limited interruption. Re-selection methods under Network Control should allow the operator to optimize service availability for GSM/EDGE RAN users. Handover cell selection and re-selection procedures should allow System Operators the flexibility to manage the selection either of private or public systems, as well as cell hierarchies, for radio network optimization.

7. Interworking with other systems

Specific requirements are for further study and are in progress in SA2.

[Note: It is believed Interworking is an SA2 requirement. Interworking Requirements are not done by SMG2. Will S2 provide Interworking Requirements?]

Roaming

Specific requirements are for further study and are in progress in SA2.

8. Mechanisms to meet QoS Objectives

Link Quality Control procedures are expected to be required in order to meet QoS objectives for services other than best-effort services.

Adaptive Resource Allocation

TBD

9. Operational requirements

Architecture requirements

Specific requirements are expected from SA2.

Radio operation environments

GSM/EDGE RAN should support all Radio Access Bearers in the same radio environments as specified in GSM 05.05

Radio access network planning

For a comparable services, GSM/EDGE RAN should provide coverage at least as good as GSM Release 99. GSM/EDGE RAN systems should not affect the performance of existing EGPRS/GSM systems.

GSM/EDGE RAN should support frequency planning similar to GSM Release 99.

Note: Coverage for RT services of GSM/EDGE RAN needs to be defined.

Interference Management

GSM/EDGE RAN should support interference management at least similar to GSM Release 99. For example, the GSM/EDGE RAN solution should not preclude the use of smart antennas.

Frequency bands and licensing

GSM/EDGE RAN systems should be deployable in at least those frequency bands defined in GSM 05.05 release 99.

10. Efficient spectrum usage

Spectral efficiency

For comparable services, GSM/EDGE RAN systems should have significantly higher spectral efficiency as compared to Release 99. It is understood that implementation of increased spectral efficiency may be restricted by the requirement of creating a Release 2000 Standard.

Spectrum utilization

It should be possible to introduce GSM/EDGE RAN to support all supported services in 2.4 MHz of spectrum. It is recognized that spectrum efficiency may be greater with larger spectrum deployments.

11. Evolution requirements

Deployment

GSM/EDGE RAN should be flexible to support a variety of initial deployments.

It should be possible to deploy GSM/EDGE RAN with a minimum of upgrades to GSM Release 99 radio equipment. GSM/EDGE RAN may be deployed as a contiguous coverage, Island coverage, or Spot coverage system. It is anticipated that GSM/EDGE RAN will also be deployed on a city-by-city basis.

Coexistence with other systems

It should be possible to deploy GSM/EDGE RAN in spectrum shared with GSM Release 99, as well as other GSM systems. GSM/EDGE RAN should be deployable in carriers and time slots adjacent to those supporting GSM Release 99, at least with fixed division of time slots between GSM/EDGE RAN and the other systems.

It is recognized that there may be advantages to dedicating radio resources system-wide to some types of GSM/EDGE RAN operation.

For further study. Different road maps & rollout is an issue for consideration.

12. Complexity / cost

Terminal

Hand portables and PCMCIA card sized GSM/EDGE RAN terminals should be optimized in terms of size, weight, operating time, range, and the effective radiated power and cost/performance ratio.

Network

For further study

MS types

GSM/EDGE RAN systems should support a variety of terminal types, including advanced feature phones, PDA's, PCMCIA cards, and other terminal types.

The GSM/EDGE RAN standard should support multislot operation. It should be possible to provide a variety of MS as well as Base Station types of varying complexity, cost and capabilities in order to satisfy the needs of different types of users.

13. Requirements from bodies outside SMG

Electromagnetic compatibility

GSM/EDGE RAN systems should cause no more interference to other equipment than current GSM-based systems.

RF radiation

GSM/EDGE RAN systems should operate at RF emission power levels consistent with applicable recommendations and specifications for electromagnetic radiation.

Security

For further study