3GPP TSG SA WG3 Security — S3#22 S3-020084

25 - 28 February 2002

Bristol, UK

TSG-SA WG 1 (Services) meeting #15 **S1-020642**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item: 10.13**

Title: LS on Priority Service Feasibility Study TR - draft
Source: SA1
To: SA2, SA3, SA5, CN1, CN4, RAN2, RAN3, T2, T3
Cc: -

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Attachments:

S1-020641 Priority Service Feasibility Study Report - draft

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1. Overall Description:

Please find a draft report of the Priority Service Feasibility Study (S1-020641). This feasibility study is an investigation to determine the extent existing 3GPP specifications can support Priority Service requirements.

Priority Service allows qualified and authorized users to obtain priority access to the next available radio (voice or data traffic) channels during situations when network congestion is blocking call attempts. Priority Service supports priority call progression and call completion to support an “end-to-end” priority call.

The Priority Service is intended to be utilised for both Voice and Data and therefore both elements are considered within the scope of this document. While Priority Service is meant for both Voice and Data services, the initial set of requirements address Circuit Switched Services (Voice as well as Data).

2. Actions:

SA1 is requesting SA2, SA3, SA5, CN1, CN4, RAN2, RAN3, T2 and T3 to review the draft report on Priority Services Feasibility Study contained in S1-020641 and provide feedback so that the next version of the Priority Service Feasibility Study can be produced.

3. Date of Next SA1 Meetings:

Title	Date	Location	Country
SA1 Adhocs	8 – 12 Apr 02	Sophia Antipolis	France
SA1#16	13 – 17 May 02	Victoria	Canada

TSG-SA Meeting #15 TSG S #.. (01) xxx
Cheju, Korea

TSG-SA WG 1 (Services) meeting #15 **S1-020641**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item: 10.13**

Presentation of Technical Report to TSG SA

Presentation to:	**TSG SA Meeting #15**
Document for presentation:	**TR 22.950, Version 1.0.0**
	Priority Service Feasibility Study Report
Presented for:	**Information**

Abstract of document: This is a draft technical report on Technical Report on the Feasibility Study of Priority Services.

Changes since last presentation to TSG-SA Meeting #11:

None

Outstanding Issues:

- Multimedia and non-circuit switched aspects of Priority Service have not been addressed in this feasibility study and are for further study.
- There are concerns for a PIN-based solution of Priority Services. This item is for further study.

Contentious Issues:

None

3GPP TR 22.950 V1.0.0 (2002-02)

Technical Report

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

3rd Generation Partners

Technical Specification Group Services and System Aspects; Priority Service Feasibility Study; *(Release 6)*

Keywords
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Contents

Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).
The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:
Version x.y.z
where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

This Technical Report (TR) presents the results of the Feasibility Study on Priority Service. The intent of this Feasibility Study is to assess the ability of 3GPP specifications to meet high-level requirements identified for Priority Service. This Feasibility Study consisted of a multi-step process, namely:

1. Identify high-level requirements for Priority Service.
2. Determine existing relevant 3GPP specifications for Priority Service.
3. Perform a Gap Analysis to assess the ability of existing 3GPP specifications to meet the high-level Priority Service requirements.

As defined in this document, Priority Service allows qualified and authorized users to obtain priority access to the next available radio (voice or data traffic) channels during situations when Commercial Mobile Radio Service (CMRS) network congestion is blocking call attempts. In addition, Priority Service supports priority call progression and call completion to support an “end-to-end” priority call.

The capability for pre-emption should be supported, with the option to turn it on/off depending on regional requirements. Priority Service is to be available to qualified and authorized Priority Service users at all times in equipped markets in both the HPLMN and VPLMN within a country where the CMRS provider has voluntarily decided to provide the service. Priority Service is applicable to both GERAN and UTRAN. Priority Service is intended to be used only during times of emergency situations and network congestion. Access to Priority Service is limited to key personnel and those with leadership responsibilities. Priority Service is not intended for use by all emergency service personnel.

Priority Service, supported by the 3GPP system set of services and features, is one element in ability to deliver calls of a high priority nature from mobile to mobile networks, mobile to fixed networks, and fixed to mobile networks. To this end, it is imperative that the Priority Service in mobile networks is compatible with fixed network capabilities.

Priority Service priority levels provide access to the next available radio (voice or traffic) channels on a priority basis to qualified and authorized Priority Service users before any other CMRS users. Priority Service is activated on a per call basis using Priority Service dialing procedures.

Priority Service providers should adhere to uniform, nationwide operating access procedures. Priority Service can provide significant benefits for public safety. There may be times during emergencies when non-Priority Service subscribers will be unable to obtain access to their wireless services (because Priority Service personnel are using the channels); nevertheless, the benefits of Priority Service outweigh any inconvenience to non-Priority Service subscribers.

1 Scope

This Technical Report (TR) presents the results of the Feasibility Study on Priority Service. The intent of this Feasibility Study is to assess the ability of 3GPP specifications to meet high-level requirements identified for Priority Service. This Feasibility Study consisted of a multi-step process, namely:

1. Identify high-level requirements for Priority Service.
2. Determine existing relevant 3GPP specifications for Priority Service.
3. Perform a Gap Analysis to assess the ability of existing 3GPP specifications to meet the high-level Priority Service requirements.

Additional functionalities not documented in this TR are considered outside the scope of this TR. Such additional functionality may be on a network-wide basis, nation-wide basis or particular to a group of users. Such additional functionality shall not compromise conformance to the requirements of the Priority Service defined in this specification.
The Priority Service is intended to be utilised for both Voice and Data and therefore both elements are considered within the scope of this document. While Priority Service is meant for both Voice and Data services, the initial set of requirements address Circuit Switched Services (Voice as well as Data). Multimedia and non-circuit switched aspects of Priority Service have not been addressed in this feasibility study and are for further study.
The Priority Service is intended to interwork with external networks to provide an end-to-end service. Therefore, service interactions with external networks are considered within the scope of this document, although the specification of these interactions may be in other standards. If this occurs, a reference to that specification shall be made.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TR 41.001: "GSM Release specifications".

[2] TS 21.905: "Vocabulary for 3GPP Specifications"

[3] ETSI TS 100 921 version 7.0.1 (1999-07), Digital cellular telecommunications system (Phase 2+); Service accessibility (GSM 02.11 version 7.0.1 Release 1998)

[4] 3GPP TS 22.011 version 3.5.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Service accessibility (Release 1999)

[5] 3GPP TS 22.011 version 4.4.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Service accessibility (Release 4)

[6] ETSI EN 300 924 version 7.0.1 (2000-01), Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 1 (GSM 02.67 version 7.0.1 Release 1998)

[7] 3GPP TS 03.67 version 7.2.0 (2000-12), 3rd Generation Partnership Project; Technical Specification Group Core Network; Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 2 (Release 1998)

[8] ETSI EN 300 927 version 7.0.1 (2000-01), Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 3 (GSM 04.67 version 7.0.1 Release 1998)

[9] 3G TS 22.067 version 3.0.1 (1999-10), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 1 (Release 1999)

[10] 3GPP TS 23.067 version 3.3.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 2 (Release 1999)

[11] 3GPP TS 24.067 version 3.3.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 3 (Release 1999)

[12] 3G TS 22.067 version 4.0.0 (2000-01), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 1 (Release 4)

[13] 3GPP TS 23.067 version 4.1.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 2 (Release 4)

[14] 3GPP TS 24.067 version 4.1.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 3 (Release 4)

[15] GSM 11.11 v7.6.1, Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface; Release 1998

[16] GSM 04.08 v7.13.0, Mobile Radio Interface Layer 3 Specification; Release 1998

[17] 3GPP TS 11.11 v8.5.0, Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface; Release 1999

[18] 3GPP TS 51.011 v4.1.0, Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface; Release 4

[19] 3GPP TS 08.08 v. 7.7.0, Mobile-services Switching Centre- Base Station System (MSC - BSS) interface Layer 3 specification; Release 1998

[20] 3GPP TS 25.413 v. 4.2.0, UTRAN Iu interface RANAP signalling; Release 4

[21] 3GPP TS 24.008 v. 4.4.0, Mobile radio interface layer 3 specification; Core Network Protocols - Stage 3; Release 4

3 Definitions, symbols and abbreviations

Delete from the above heading those words which are not applicable.

Subclause numbering depends on applicability and should be renumbered accordingly.

3.1 Definitions

For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.
Definition format

***<defined term>**: <definition>.*

example: text used to clarify abstract rules by applying them literally.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:
Abbreviation format

<ACRONYM> <Explanation>

4 High Level requirements

The following sections describe the high-level requirements to support Priority Service. These high-level requirements are used as a basis for the gap analysis described in Section 6.

4.1 Priority Call Origination

The Priority Service user shall receive priority access to voice or traffic channels on call origination.

4.2 Priority Call Termination

The Priority Service user shall receive priority call termination.

4.3 Priority Call Progression

The Priority Service user shall receive priority call treatment/progression through the mobile network(s). A priority call should be given higher priority over normal calls in the originating mobile network, to interconnected networks supporting priority (including the PSTN) and in the terminating network. Note: The ISDN MLPP feature may be used for signalling of priority level in the core network. The mapping of eMLPP priority levels and MLPP priority levels is for further study.**"**

4.4 Priority Queuing

Priority Service assumes a signalling channel is always available.

When a Priority Service call encounters a "no radio available" condition in the call path involving an access or egress air-interface, or both, and,

- at call origination, and upon recognition of the Priority Service dialing pattern, the Priority Service call is queued in the cell serving the calling party and processed for the next available radio channel in that cell in accordance with the caller's priority level and call initiation time.

- at call termination upon recognition of a priority call indication in an incoming call, the Priority Service call is queued in the cell serving the called party and processed for the next available radio channel in that cell in accordance with the call's priority level and arrival time.

4.5 Priority Levels

The Priority Service subscriber shall be assigned one of *n* priority levels. Priority levels are defined as 1, 2, 3,…,*n* , with 1 being the highest priority level and *n* being the lowest priority level. Refer to Annex A for Regional requirements for priority levels.

4.6 Invocation on Demand

Priority Service is invoked only when requested and an idle voice or traffic channel required for an origination request is not available.

If an idle voice or traffic channel is available when Priority Service is requested, the origination request is allowed to proceed normally without delay.

Invocation of Priority Service at access (origination), during call progression (end-to-end), or egress (termination) is considered complete when one of the following occurs:

- A radio (voice or traffic) channel is assigned to the call (at origination or termination),
- The loss of radio contact or roaming to another CMRS provider's system (at origination only),
- The subscriber cancels the request by pressing the [END] key.
- Expiration of the maximum allowed time to hold for the next available radio (voice or traffic) channel (at origination or termination), or
- Deletion of the Priority Service request due to arrival of a higher priority request coupled with lack of queue capacity (at origination or termination).

4.7 Applicability to Telecommunications Services

Priority Service shall be applicable to voice and data telecommunications services that require a voice or traffic channel assignment.

4.8 Authorization

A subscriber invoking Priority Service on call origination is authorized based on the caller's subscription. It should also be possible for the subscriber to make a priority call by using any 3GPP UE. In this case authorization of the subscriber may be realized by the usage of a PIN. The PIN solutions is for further study and needs to be standardized. The user priority levels (1-n) and the associated PINs are assigned by the appropriate national authority and are fixed, i.e., a subscriber may not be allowed to change the PIN or the priority level. Note: There are some concerns related to security for "PIN Authorization".

4.9 Priority Service Feature Code

Priority Service is manually requested by adding on the Priority Service feature code to the origination request, as in:

* FC + termination address + [SEND]

* [Editors Note: The selection of the appropriate FC for Priority Services is under investigation. Once selected, the document may need to be updated with the appropriate FC.]

4.10 Roaming

Priority Service shall able to be supported during roaming when the roaming network supports Priority Service.

4.11 Handover

Priority Service shall able to be supported during handover.

4.12 Call Detail Record

The system should record the following Priority Service call detail information, in addition to non-Priority Service CDR information:

a Priority Service invocation attempts.

b Call legs (origination and/or termination) on which Priority Service was used to gain access to the radio channel.

c Recording of appropriate Priority Service information (e.g., Priority Level, PIN usage indication). Note: The value of recording this information in CDRs is for further study.

5 Additional Description of Priority Service

5. 1 At call origination

If a user invokes and is authorized for Priority Service and a radio (voice or traffic) channel is available, then the call is allowed to proceed in the originating system. The call is given priority treatment during progression through the network.

If a user invokes and is authorized for Priority Service but a radio (voice or traffic) channel is not available, the call is queued for the next available radio channel in the cell in accordance with the user's priority level and call initiation time. The user should be given an indication that the call is progressing. The network treats the user as busy while a priority call request for the user is queued. .

If a user invokes and is authorized for Priority Service and a radio (voice or traffic) channel is not available, if the queue for the cell is full, and if the user's Priority Service priority is higher than one or more Priority Service calls already in the queue, then the lowest, most recent call in the queue is dropped from the queue. The user's call is placed in the queue in accordance with the user's priority level and call initiation time. The user should be given an indication that the call is progressing. The network treats the user as busy while a priority call request for the user is queued.

It is desirable that if the system changes the resources allocated to a Service User (e.g., cell handover), the call set-up should proceed, as if the resources had remained the same (e.g., queue status). [Editor's note: an investigation needs to determine whether handover occurs between cells, i.e., what is the lowest "level" of handover?]

The following indications should be provided to the subscriber:

i Acceptance of a Priority Service request.

ii Rejection of a Priority Service request.

iii Loss of a pending request (including loss of radio contact and possibly roaming to another system).

iv Preemption of a pending request.

A priority call request may be removed from the queue by the Service User pressing the END key. The request shall also be removed by the system, if radio contact is not maintained with the requesting MS.

[Editor's Note: There is a request to consider merging iii and iv because from a user's perspective they may appear similar. This item requires further clarification.]

[Editor's Note: A clarification is needed on the requirement for queuing during handover scenarios i.e., if the subscriber is to be queued in the new cell at the bottom of the queue or at the same queue status (place/time) as previously.]

5. 2 During call progression

The Priority Service call receives priority treatment for call routing to interconnected networks supporting priority.

5. 3 At call termination

If a terminating radio (voice or traffic) channel is available, the call is terminated to the called party.

If a terminating radio (voice or traffic) channel is not available, the call is queued for the next available radio channel in the cell serving the called party in accordance with the call's priority level. When a terminating radio channel becomes available and is assigned to the call, the call is terminated to the called party.

If a terminating radio (voice or traffic) channel is not available, the queue for the cell serving the called party is full, and the call's priority level is higher than one or more Priority Service calls in the queue, then the lowest, most recent call in the queue is dropped from the queue. The user's call is entered in the queue in accordance with the call's priority level. When a terminating radio channel becomes available and is assigned to the call, the call is terminated to the called party.

It is desirable that if the system changes the resources allocated to the called party (e.g., cell handover), the call set-up should proceed, as if the resources had remained the same (e.g., queue status).

5.4 Exception Procedures or Unsuccessful Outcome

At call origination, the following exceptions or unsuccessful outcomes can occur:

1 If the user invokes but is not authorized for Priority Service, call setup is not allowed to proceed and the call is dropped.

2 If the user invokes and is authorized for Priority Service but the user's mobile set times out while the call is undergoing Priority Service call queue processing, the user's mobile returns to the null state and the call is dropped.
3 If a user invokes and is authorized for Priority Service, a radio channel is not available, and the queue for the cell is full, and the user's Priority Service priority is lower than all of the Priority Service calls in the queue, the call is dropped.
4 If a user invokes and is authorized for Priority Service, and is queued for a radio channel, but the user loses coverage, the call is removed from the queue and is dropped.
5 If a user invokes and is authorized for Priority Service, and is queued for a radio channel, but the maximum allowed call time in queue expires before a radio channel becomes available in the cell, the call is removed from the queue and is dropped.

At call termination the following exceptions or unsuccessful outcomes can occur:

1 If a radio channel is not available and the queue for the cell is full, but the calling party's priority is lower than all of the Priority Service calls in the queue, the call is not completed and the Service User is given an appropriate indication.
2 If the call is queued for a radio channel but the called party's mobile loses coverage, the call is removed from the queue and the Service User is given an appropriate indication.
3 If the call is queued for a radio channel but the maximum allowed call time in queue expires before a radio channel becomes available in the designated terminating cell, the call is removed from the queue and the Service User is given an appropriate indication.

5.5 Features Interactions

Call Waiting
Priority Service call users will not receive an incoming call indication while the call is being queued.

Call forwarding and call re-direction
Users will not be allowed to invoke Priority Service calls through call forwarding or re-direction.
(E.g., "*FC + termination address" as a forwarded-to number, or PS invocation through other re-direction services, such as IN DP12 Redirection etc.)

Call Origination Restrictions
Priority Service shall override Call origination Restrictions for Barring of Outgoing Calls (BAOC), Barring of outgoing International Calls (BOIC) and Barring of Outgoing International Calls except to Home PLMN Country (BOIC-exHC), as a network option. Note: This may be necessary only for the PIN-based solution.

eMLPP (USA regional requirement)
Priority Service call attempt shall override any eMLPP priority levels that may be received from eMLPP capable mobile phones. That is Priority Service users shall be able to only invoke their assigned priority level. If a Priority Service user has an eMLPP capable phone and attempts to use an eMLPP priority level in addition to Priority Service *FC dialing, the eMLPP priority level request will be ignored by the network.

(Note: if Priority Service is implemented using eMLPP, the above interaction should be reconsidered. If Priority Service is implemented using eMLPP, the Priority Service level that is assigned by the appropriate national authority and eMLPP level that is provisioned to provide the service might be different. Also, if the Service Provider offers eMLPP service to subscribers other than Priority Service subscribers, these eMLPP levels might also conflict or contradict the offered service. The Service Provider, in conjunction with the national authority, needs to reconcile these possible conflicts.)

Prepaid service
Priority Service applies only to post-paid calls. Users shall not be allowed to subscribe to Priority Service and Prepaid.

Emergency Calls (USA regional requirement)
There is no interaction between Priority Service and emergency calls. If *FC [emergency call number] is dialed and Priority Service authentication fails, the call will be released, otherwise the call is processed as a Priority Service call.

6 Priority Service Gap Analysis

6.1 Service Accessibility

Service Accessibility is specified in:

Release 1998:
- ETSI TS 100 921 version 7.0.1 (1999-07), Digital cellular telecommunications system (Phase 2+); Service accessibility (GSM 02.11 version 7.0.1 Release 1998);

Release 1999:
- 3GPP TS 22.011 version 3.5.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Service accessibility (Release 1999); and

Release 4:
- 3GPP TS 22.011 version 4.4.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Service accessibility (Release 4).

Service Accessibility supports an Access Control capability that is pertinent to Priority Service.

6.1.1 Summary of Service Accessibility Capabilities

The Access Control capability prevents mobile users from initiating call origination attempts and from responding to pages in specific areas (e.g., in emergency situations where resource shortages exist). Access control is intended to allow network operators to prevent overload of radio access channels under critical conditions.
The basic mechanism is administered as follows: All SIMs are randomly assigned to one of ten access classes (0 – 9). In addition, SIMs may also be members of one or more of five special categories (access classes 11 to 15). These special classes are designated for specific purposes as summarized in the following table:

Access Class	***Usage***	***Applicability***
15	PLMN Staff	Home PLMN Only
14	Emergency Services	Home and Visited PLMNs of home country only
13	Public Utilities	
12	Security Services	
11	For PLMN Use	Home PLMN Only
0 - 9	General Use	Home and Visited PLMNs

In an emergency situation, broadcast messages are used (on an individual cell basis) to indicate the "Access Classes" of subscribers that are barred from network access. Any number of classes may be barred at any one time. For example, to reduce approximately 20 percent of the basic mobile traffic in a given cell, broadcast messages might indicate that two of the basic access classes should be barred from access. Upon receiving an emergency broadcast message, those mobiles belonging to the barred access classes (and not also being members of any of the special classes) should not initiate a call attempt or respond to a page[1]. In addition, broadcast messages use "access class 10" to indicate whether network access is allowed for emergency calls.
Access Control is designed to suppress not only the ability of non-priority end users to seize traffic channels, but also the ability of those end users to use signaling channels for call attempts. Service Accessibility, as specified, cannot be turned on and off by the end user.

6.1.2 Support for Priority Service

The following table identifies Service Accessibility support for Priority Service.

[1] If a mobile is a member of at least one permitted Access Class, as signaled over the air interface, and the Access Class is applicable in the serving network, access attempts are allowed. Otherwise access attempts are not allowed.

Priority Service Requirement Item	**Description**	**Service Accessibility Support**	**Comments**
1. Priority Call Origination	The user should receive priority access to voice or traffic channels on call origination.	Supported	Using appropriate Access Class(es) to prevent access attempts
2. Priority Call Termination	The user should receive priority call termination.	Supported	Using appropriate Access Class(es) to prevent response to pages
3. Priority Progression	The user should receive priority call treatment/progression through the network(s). A wireless priority call should be given higher priority over normal calls in the network and through any interconnected networks.	Not supported	
4. Priority Queuing	When a Priority Service call encounters a "no radio available" condition in the call path involving an access or egress air-interface, or both, and, • at call origination, and upon recognition of the Priority Service dialing pattern, the Priority Service call is queued in the cell serving the calling party and processed for the next available radio channel in that cell in accordance with the caller's priority level and call initiation time. • at call termination upon recognition of a priority call indication in an incoming call, the Priority Service call is queued in the cell serving the called party and processed for the next available radio channel in that cell in accordance with the call's priority level and arrival time.	Not supported	
5. Priority Level and PIN	The subscriber should be assigned one of *n* priority levels and an associated PIN at the time of subscription. Priority levels are defined as 1, 2, 3,…,*n* , with 1 being the highest priority level and n being the lowest priority level..	Partially supported	Ten (0-9) randomly allocated Access Classes. Five (11-15) special classes. Enumeration of special classes is not meant as a priority sequence. Priority Service priority levels could map to special Access Classes.
6. Invocation on Demand	The invocation of Priority Service is determined by subscription to the Demand option. In the Demand option the feature is available only on request. The subscriber requests Priority Service by using a feature code with an origination request.	Not supported	
7. Applicable to voice and data	Priority Service shall be applicable to voice and data telecommunications services that require a voice or traffic channel assignment.	Supported	
8. Authorized by Subscription	Priority Service may be generally available or provided after prearrangement with the service provider. If a carrier chooses to provide Priority Service, it shall be made available at all times. A	Supported	Access Classes stored in the SIM.

	Priority Service subscriber is assigned a priority level (1, 2, 3,…,n, with 1 being the highest and n being the lowest). Priority Service may be optionally authorized on demand. Then only the calls originated with specific Priority Service *FC receive priority based on the subscriber's assigned priority level.		
9. Authorized by PIN	A subscriber invoking Priority Service on call origination is authorized based on the caller's subscription, assigned priority level and a PIN. The user priority levels 1-5 and the associated PINs are assigned by the appropriate national authority and are fixed, i.e., a subscriber may not be allowed to change the PIN or the priority level.	Not supported	
10. Priority Service feature code	Priority Service is invoked only when requested and an idle voice or traffic channel required for an origination request is not available. For Priority Service subscribers, Priority Service is manually requested by adding on the Priority Service feature code to the origination request.	Not supported	
11. Priority Service supported during intersystem roaming	Priority Service may be supported during intersystem roaming.	Partially supported	Access classes 0-9 pertain to ***Home and Visited PLMNs***. Access classes 11 and 15 pertain to ***Home PLMN only***. Access classes 12, 13, and 14 pertain to ***Home and Visited PLMNs <u>of home country only</u>***.
12. Priority Service supported during intersystem handover	Priority Service may be supported during intersystem handover.	Not supported	
13. Priority Service call detail record	The system should record the following Priority Service call detail information: a) Priority Service invocation attempts, and the reason for the cessation of any request. b) Duration of Priority Service requests. c) Call legs (origination and/or termination) on which Priority Service was used to gain access to the radio (voice or traffic) channel. d) Recording of appropriate billing information assigned at the Priority Service service.	Not supported	

6.2 Enhanced Multi-Level Precedence and Pre-emption (eMLPP)

eMLPP is specified in:
Release 1998:

- ETSI EN 300 924 version 7.0.1 (2000-01), Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 1 (GSM 02.67 version 7.0.1 Release 1998);
- 3GPP TS 03.67 version 7.2.0 (2000-12), 3rd Generation Partnership Project; Technical Specification Group Core Network; Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 2 (Release 1998);
- ETSI EN 300 927 version 7.0.1 (2000-01), Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 3 (GSM 04.67 version 7.0.1 Release 1998);

Release 1999:

- 3G TS 22.067 version 3.0.1 (1999-10), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 1 (Release 1999);
- 3GPP TS 23.067 version 3.3.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 2 (Release 1999);
- 3GPP TS 24.067 version 3.3.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 3 (Release 1999);

Release 4:

- 3G TS 22.067 version 4.0.0 (2000-01), 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 1 (Release 2000);
- 3GPP TS 23.067 version 4.1.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 2 (Release 4);
- 3GPP TS 24.067 version 4.1.0 (2001-06), 3rd Generation Partnership Project; Technical Specification Group Core Network; enhanced Multi-Level Precedence and Pre-emption (eMLPP) – Stage 3 (Release 4).

6.2.1 Summary of eMLPP Capabilities

The eMLPP service is provided as a network operator's option to a domain of a network. The domain can be the whole network or a subset of the network. The eMLPP service applies to all network resources in the domain, and eMLPP is provided to a subscriber for all basic services subscribed to and for which eMLPP applies.
The eMLPP service supports two capabilities: precedence and preemption.
Precedence involves the assignment of a priority level to a call. eMLPP supports a maximum of seven priority levels. The two highest levels (A and B) are reserved for network internal use (e.g., for emergency calls). These are only used locally (i.e., in the domain of one MSC)[2]. The other five priority levels are offered for subscription and can be applied globally (presuming the priority level is successfully passed from the originating end and processed at the terminating end).
For each of the seven priority levels, the network operator can administer parameters that control the treatment of that priority within its domain. This treatment includes the selection of a target set-up time and whether or not pre-emption is allowed for each priority level. For example, a network operator might administer priority levels as follows:

Priority Level	Set-Up Time	Pre-emption
A	Class 1	no
B	Class 2	no
0	Class 2	no
1	Class 3	no
2	Class 3	no
3	Class 3	no
4	Class 3	no

[2] Levels A and B are mapped to priority level 0 for priority treatment outside of the MSC area in which they are applied.

In the example above, three classes of set-up time performance are supported. In the above example, the network operator has assigned class 1 (fast set-up, nominally 1-2 seconds[3]) to Priority Level A traffic, has assigned class 2 (normal set-up, nominally less than 5 seconds) to traffic at Priority Levels B and 0, and has assigned class 3 (slow set-up, nominally less than 10 seconds) to the lower Priority Level traffic. 3GPP specifications do not define specific mechanisms (which may include specific technical capabilities and/or network engineering decisions) to achieve the target set-up times as defined by the service provider[4].

If idle resources are not available, preemption involves the seizure of resources (currently in use by a lower-priority call) for use by a call that is of higher priority. The network releases the lowest-priority call and seizes the necessary resources that are required to set up the higher-priority call. At handover to a congested cell, higher-priority calls replace existing calls of the lowest priority.

In the above example, the network operator has chosen not to allow preemption. Thus, priority levels will use different queuing priorities rather than preemption capabilities.

The eMLPP priority level for a given call depends on the calling subscriber. The maximum precedence level for each subscriber is set at subscription time (and is stored on the SIM).

The default priority level is established via normal registration procedures. If the user does not explicitly select a precedence level at call set-up, the network applies the subscriber-specific default precedence level.

The priority level can be selected by the user on a per-call basis (up to and including their maximum authorized precedence level).

The eMLPP service is invoked automatically by the network at call set-up, with the priority level established as above for mobile-originated calls. For mobile-terminated calls, the priority level is established based on the priority of the calling party, and is applied at the terminating end (presuming the call's priority is passed via signaling between the originating and terminating networks). Interworking with ISDN MLPP is required.

The eMLPP service applies to roaming scenarios, if eMLPP is supported by the related networks.

The HLR maintains the logical state for eMLPP (provisioned or not provisioned), the maximum priority level, and the default priority level for each user.

The MSC stores service configuration information for each priority level (i.e., set up time [class] and pre-emption indicators, as illustrated in the previous section).

The SIM stores data that influences MS actions, as noted in the following table:

Priority Level	***Subscription Available***	***Automatic answering***	***Fast set-up actions***
A	yes / no	yes / no	yes / no
B	yes / no	yes / no	yes / no
0	yes / no	yes / no	yes / no
1	yes / no	yes / no	yes / no
2	yes / no	yes / no	yes / no
3	yes / no	yes / no	yes / no
4	yes / no	yes / no	yes / no

The maximum authorized precedence level is stored on the SIM, allowing the mobile station to check that only an authorized level is used for set-up. (In addition, the network may verify the level used at set-up against the maximum authorized level.)

In the case of automatic answering of an incoming call with a sufficient priority level, the alerting indication to the calling party may not be provided in order to shorten the set-up time. If the called mobile subscriber is busy and automatic answering applies, the existing call may be released (if preemption applies) or may be placed on hold in order to accept an incoming call of higher priority.

6.2.2 Support for Priority Service

The following table identifies eMLPP support for Priority Service.

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3 Calls with a high priority requiring class 1 set-up may not require authentication at call set-up nor confidentiality on the radio link.

4 Set-up times are defined for operation under normal circumstances (no congestion) and include the time from pressing the "send" button to the time the called party can receive information (excluding user reaction times).

Priority Service Requirement Item	**Description**	**eMLPP Support**	**Comments**
1. Priority Call Origination	The user should receive priority access to voice or traffic channels on call origination.	Supported	Based on subscribed priority level
2. Priority Call Termination	The user should receive priority call termination.	Supported	Based on priority level of calling party
3. Priority Progression	The user should receive priority call treatment/progression through the network(s). A wireless priority call should be given higher priority over normal calls in the network and through any interconnected networks.	Supported	Requires interworking with ISDN MLPP
4. Priority Queuing	When a Priority Service call encounters a "no radio available" condition in the call path involving an access or egress air-interface, or both, and, • at call origination, and upon recognition of the Priority Service dialing pattern, the Priority Service call is queued in the cell serving the calling party and processed for the next available radio channel in that cell in accordance with the caller's priority level and call initiation time. • at call termination upon recognition of a priority call indication in an incoming call, the Priority Service call is queued in the cell serving the called party and processed for the next available radio channel in that cell in accordance with the call's priority level and arrival time.	Partially Supported	Priority levels with no pre-emption capability allocated shall only have queuing priority 22.067, ch 4. Note: BSS implementations should have internal functionality to handle signaling channels overload, however in case of complete congestion there may not be way to guarantee priority access to network, however due to large capacity of paging and random access channels the complete overload of signaling channels very rare and thus is not likely to be the bottle neck.
5. Priority Level and PIN	The subscriber should be assigned one of *n* priority levels and an associated PIN at the time of subscription. Priority levels are defined as 1, 2, 3,…,*n* , with 1 being the highest priority level and n being the lowest priority level..	Partially supported	Seven priority levels (with five available for subscription). Priority Service priority levels could map to eMLPP priority levels. No mention of PIN.
6. Invocation on Demand	The invocation of Priority Service is determined by subscription to the Demand option. In the Demand option the feature is available only on request. The subscriber requests Priority Service by using a feature code with an origination request.	Supported	If the user has an eMLPP subscription, the call shall have the priority level selected by the user at set-up or the priority level predefined by the subscriber as default priority level by registration.
7. Authorized by PIN	Priority Service shall be applicable to voice and data telecommunications services that require a voice or traffic channel assignment.	Supported	eMLPP is a supplementary service and shall be provided to a subscriber for all basic services subscribed to and for which eMLPP applies.
8. Priority Service feature code	Priority Service may be generally available or provided after prearrangement with the service provider. If a carrier chooses to provide Priority Service, it shall be made available at all times. A Priority Service subscriber is assigned a priority level (1, 2, 3,…,n, with 1 being the highest and n being the lowest). Priority Service	Supported	Priority level stored in the SIM.

	may be optionally authorized on demand. Then only the calls originated with specific Priority Service *FC receive priority based on the subscriber's assigned priority level.		
9. Priority Service supported during intersystem roaming	A subscriber invoking Priority Service on call origination is authorized based on the caller's subscription, assigned priority level and a PIN. The user priority levels 1-5 and the associated PINs are assigned by the appropriate national authority and are fixed, i.e., a subscriber may not be allowed to change the PIN or the priority level.	Not supported	
10. Priority Service supported during intersystem handover	Priority Service is invoked only when requested and an idle voice or traffic channel required for an origination request is not available. For Priority Service subscribers, Priority Service is manually requested by adding on the Priority Service feature code to the origination request.	Partially supported	The exact MMI proposed is not supported. The MMI supported by eMLPP is specified in 22.030. The feature code is 75.
11. Priority Service call detail record	Priority Service may be supported during intersystem roaming.	Supported	eMLPP is applicable in case of roaming, if supported by the related networks.
12. Authorized by PIN	Priority Service may be supported during intersystem handover.	Partially supported	When pre-emption applies, at handover to a congested cell, higher priority calls shall replace those of the lowest priority. The pre-empted user shall receive an indication for congestion as defined in GSM 02.40.
13. Priority Service feature code	The system should record the following Priority Service call detail information: a) Priority Service invocation attempts, and the reason for the cessation of any request. b) Duration of Priority Service requests. c) Call legs (origination and/or termination) on which Priority Service was used to gain access to the radio (voice or traffic) channel. d) Recording of appropriate billing information assigned at the Priority Service service.	Supported	TS 22.067 ch 5.11.The utilized precedence level shall be able to be extracted from the event records if different from the default precedence level.

6.3 Subscriber Identity Module (SIM) Specifications

Release 1998:

- GSM 11.11 v7.6.1, Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface; Release 1998;

- GSM 04.08 v7.13.0, Mobile Radio Interface Layer 3 Specification; Release 1998

Release 1999:

- 3GPP TS 11.11 v8.5.0, Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface; Release 1999;

Release 4:

- 3GPP TS 51.011 v4.1.0, Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface; Release 4;

6.3.1 Summary of SIM-based Capabilities

The SIM specifications address the allocation and administration of *Access Control Classes* for control of Service Accessibility.

All mobile stations with an inserted SIM are members of one out of 10 access classes numbered 0 to 9. In addition, mobile stations may be members of one or more out of 5 special access classes (access classes 11 to 15). Both the regular as well as the special access class number are stored in the SIM. The access control class is a parameter to control the RACH utilization. The first 10 Access Control Classes (0-9) are randomly allocated to normal subscribers; and the top 5 classes (11-15) are allocated to specific high priority users.

The system information messages on the BCCH broadcast the list of authorized access classes and authorized special access classes in the system information messages, and whether emergency calls are allowed in the cell to all mobile stations or only to the members of authorized special access classes.

If the establishment cause for the request of the MM sub-layer is not "emergency call", access to the network is allowed if and only if the mobile station is a member of at least one authorized:

- access class; or
- special access class.

If the establishment cause for the request of the MM sub-layer is "emergency call", access to the network is allowed if and only if:

- emergency calls are allowed to all mobile stations in the cell; or
- the mobile station is a member of at least one authorized special access class.

Access Control is designed to suppress not only the ability of non-priority end users to seize traffic channels, but also the ability of those end users to use signaling channels for call attempts. Access Control class cannot be updated by the end-user, but by the operator and/or another authorized body. The information i.e., the access class field can be updated either over the air (with caution) or via SIM Toolkit. Security and authentication mechanism for the update of access control class need to be further investigated.

6.3.2 Support for Priority Service

The following table identifies SIM based support for Priority Service.

Priority Service Requirement Item	**Description**	**SIM Support**	**Comments**
1. Priority Call Origination	The user should receive priority access to voice or traffic channels on call origination.	Supported	
2. Priority Call Termination	The user should receive priority call termination.	Supported	
3. Priority Progression	The user should receive priority call treatment/progression through the network(s). A wireless priority call should be given higher priority over normal calls in the network and through any interconnected networks.	Not supported	
4. Priority Queuing	When a Priority Service call encounters a "no radio available" condition in the call path involving an access or egress air-interface, or both, and, • at call origination, and upon recognition of the Priority Service dialing pattern, the Priority Service call is queued in the cell serving the calling party and processed for the next available radio channel in that cell in accordance with the caller's priority level and call initiation time. • at call termination upon recognition of a priority call indication in an incoming call, the Priority Service call is queued in the cell serving the called party and processed for the next available radio channel in that cell in accordance with the call's priority level and arrival time.	Not supported	
5. Priority Level and PIN	The subscriber should be assigned one of *n* priority levels and an associated PIN at the time of subscription. Priority levels are defined as 1, 2, 3,…,*n* , with 1 being the highest priority level and n being the lowest priority level..	Partially supported	Ten (0-9) randomly allocated Access Classes. Five (11-15) special classes. Enumeration of special classes is not meant as a priority sequence. PS priority levels could map to special Access Classes.
6. Invocation on Demand	The invocation of Priority Service is determined by subscription to the Demand option. In the Demand option the feature is available only on request. The subscriber requests Priority Service by using a feature code with an origination request.	Partially Supported	The user can insert a special SIM when he/she needs to make a priority call.
7. Authorized by PIN	Priority Service shall be applicable to voice and data telecommunications services that require a voice or traffic channel assignment.	Supported	
8. Priority Service feature code	Priority Service may be generally available or provided after prearrangement with the service provider. If a carrier chooses to provide Priority Service, it shall be made available at all times. A Priority Service subscriber is assigned a priority level (1, 2, 3,…,n,	Supported	Access Classes stored in the SIM.

	with 1 being the highest and n being the lowest). Priority Service may be optionally authorized on demand. Then only the calls originated with specific Priority Service *FC receive priority based on the subscriber's assigned priority level.		
9. Priority Service supported during intersystem roaming	A subscriber invoking Priority Service on call origination is authorized based on the caller's subscription, assigned priority level and a PIN. The user priority levels 1-5 and the associated PINs are assigned by the appropriate national authority and are fixed, i.e., a subscriber may not be allowed to change the PIN or the priority level.	Not supported	
10. Priority Service supported during intersystem handover	Priority Service is invoked only when requested and an idle voice or traffic channel required for an origination request is not available. For Priority Service subscribers, Priority Service is manually requested by adding on the Priority Service feature code to the origination request.	Not supported	
11. Priority Service call detail record	Priority Service may be supported during intersystem roaming.	Partially supported	Access classes 0-9 pertain to ***Home and Visited PLMNs***. Access classes 11 and 15 pertain to ***Home PLMN only***. Access classes 12, 13, and 14 pertain to ***Home and Visited PLMNs <u>of home country only</u>***.
12. Authorized by PIN	Priority Service may be supported during intersystem handover.	Not supported	
13. Priority Service feature code	The system should record the following Priority Service call detail information: a) Priority Service invocation attempts, and the reason for the cessation of any request. b) Duration of Priority Service requests. c) Call legs (origination and/or termination) on which Priority Service was used to gain access to the radio (voice or traffic) channel. d) Recording of appropriate billing information assigned at the Priority Service service.	Not supported	

6.4 Assignment request Priority Information Element

Priority Information Element (PIE) is specified in 3GPP TS 08.08 [19] and 3GPP TS 25.413 [20]. The term used for the *Assignment request Priority Information Element* in Release 4 is *Allocation/Retention Priority*.

6.4.1 Summary and coding of Priority Information Element Capabilities

This element indicates the priority of the assignment request in A and Iu interface. Following information may be included in IE:

- priority level of the request (levels 1-14),
- if the request can be queued,
- if the request may pre-empt an existing connection and
- if the request can be pre-empted by another request.

The management of priority levels is implementation dependent, under operator control.
Priority information IE is also used if the Network supports eMLPP: "The priority level of a call shall be determined by the MSC. Accordingly, the MSC shall request channel assignment with an indication of the priority level and the pre-emption capability of that call. For this the MSC shall use the priority message element as defined in GSM 08.08. Mapping of the priority information in this message element on the network specific eMLPP configuration shall be performed in the MSC. Queuing and resource pre-emption shall be performed accordingly if necessary." (23.067 [10])
It is coded as follows [19]:

8	7	6	5	4	3	2	1	
Element identifier								octet 1
Length								octet 2
Priority								octet 3

Octet 2 is a binary indication of the length of the rest of the element.
Octet 3 is coded as follows:

8	7	6	5	4	3	2	1	
spare	pci	priority level				qa	pvi	octet 3

Bit 8 is spare, set to 0
pci = Preemption Capability indicator (see note)

0	this allocation request shall not preempt an existing connection
1	this allocation request may preempt an existing connection

priority level:

6 5 4 3	
0 0 0 0	spare
0 0 0 1	priority level 1 = highest priority
0 0 1 0	priority level 2 = second highest priority
: : : :	
1 1 1 0	priority level 14 = lowest priority
1 1 1 1	priority not used

qa = queuing allowed indicator

0	queuing not allowed
1	queuing allowed

pvi = Preemption Vulnerability indicator (see note)

0	this connection shall not be preempted by another allocation request
1	this connection might be preempted by another allocation request

NOTE: Preemption Capability indicator applies to the allocation of resources for an event and as such it provides the trigger to the preemption procedures/processes of the BSS. Preemption Vulnerability indicator applies for the entire duration of a connection and as such indicates whether the connection is a target of the preemption procedures/processes of the BSS.

6.4.2 Support for Priority Service

The following table identifies Priority Information Element support for Priority Service.
[Editor's Note: The following text needs to be revisited:

Do note that the 3GPP specifications do not explicitly define the use of Priority IE, e.g. the data that the setting of the Information Element fields could/should be based on. Since this information element was introduced quite early in the standards, Network Element vendors may have taken this IE into other than eMLPP uses, too. Therefore, mandating usage of these fields in 3GPP specifications in this regard could cause problems.
The table indicates issues that may be achieved with using Priority Information Element, requirements that can be fulfilled with MSC internal or other additional vendor specific functionality have been also identified. Note that vendor specific information or functionality is not needed over open interfaces, where only standardized information is used.]

Priority Service Requirement Item	**Description**	**PIE support**	**Comments**
1. Priority Call Origination	The user should receive priority access to voice or traffic channels on call origination.	Supported	
2. Priority Call Termination	The user should receive priority call termination.	Supported	
3. Priority Progression	The user should receive priority call treatment/progression through the network(s). A wireless priority call should be given higher priority over normal calls in the network and through any interconnected networks.	Not supported/vendor specific	Vendor specific functionality is needed to set priorities for each leg. This may not be supported in all interfaces or some nodes on path may not have needed functionality.
4. Priority Queuing	When a Priority Service call encounters a "no radio available" condition in the call path involving an access or egress air-interface, or both, and, 1. at call origination, and upon recognition of the Priority Service dialing pattern, the Priority Service call is queued in the cell serving the calling party and processed for the next available radio channel in that cell in accordance with the caller's priority level and call initiation time. 2. at call termination upon recognition of a priority call indication in an incoming call, the Priority Service call is queued in the cell serving the called party and processed for the next available radio channel in that cell in accordance with the call's priority level and arrival time.	Supported	
5. Priority Level and PIN	The subscriber should be assigned one of *n* priority levels and an associated PIN at the time of subscription. Priority levels are defined as 1, 2, 3,…,*n* , with 1 being the highest priority level and n being the lowest priority level..	Vendor specific	MMI used need to be recognized by number analysis.
6. Invocation on Demand	The invocation of Priority Service is determined by subscription to the Demand option. In the Demand option the feature is available only on request. The subscriber requests Priority Service by using a feature code with an origination request.	Vendor specific	MMI used need to be recognized by number analysis.
7. Applicable to voice and data	Priority Service shall be applicable to voice and data telecommunications services that require a voice or traffic channel assignment.	Supported	
8. Authorized by Subscription	Priority Service may be generally available or provided after prearrangement with the service provider. If a carrier chooses to provide Priority Service, it shall be made available at all times. A Priority Service subscriber is assigned a priority level (1, 2, 3,…,n, with 1 being the highest and n being the lowest). Priority Service	Vendor specific	MSC has various information from HLR like Subscriber category, IMSI, etc.. that can be used to identify subscription.

	may be optionally authorized on demand. Then only the calls originated with specific Priority Service *FC receive priority based on the subscriber's assigned priority level.		
9. Authorized by PIN	A subscriber invoking Priority Service on call origination is authorized based on the caller's subscription, assigned priority level and a PIN. The user priority levels 1-5 and the associated PINs are assigned by the appropriate national authority and are fixed, i.e., a subscriber may not be allowed to change the PIN or the priority level.	Vendor specific	MMI used need to be recognized by number analysis.
10. Priority Service feature code	Priority Service is invoked only when requested and an idle voice or traffic channel required for an origination request is not available. For Priority Service subscribers, Priority Service is manually requested by adding on the Priority Service feature code to the origination request.	Vendor specific	MMI used need to be recognized by number analysis.
11. Priority Service supported during intersystem roaming	Priority Service may be supported during intersystem roaming.	Not supported / Vendor specific	(Editors note: What is meant with "intersystem" here?)
12. Priority Service supported during intersystem handover.	Priority Service may be supported during intersystem handover.	Supported (?)	(Editors note: What is meant with "intersystem" here?)
13. Priority Service call detail record	The system should record the following Priority Service call detail information: a) Priority Service invocation attempts, and the reason for the cessation of any request. b) Duration of Priority Service requests. c) Call legs (origination and/or termination) on which Priority Service was used to gain access to the radio (voice or traffic) channel. d) Recording of appropriate billing information assigned at the Priority Service service.	Vendor specific	

7 Conclusions

The objectives of this Feasibility Study for Priority Service were to:

1. outline the high-level technical requirements for Priority Service,
2. identify existing 3GPP capabilities related to Priority Service,
3. perform a gap analysis to determine the extent existing 3GPP specifications can support these Priority Services requirements.

Thirteen high-level requirements were identified to support Priority Service, including:

1. Priority Call Origination,
2. Priority Call Termination,
3. Priority Progression,
4. Priority Queuing,
5. Priority Level and PIN,
6. Invocation on Demand,
7. Applicable to voice and data,
8. Authorized by Subscription,
9. Authorized by PIN,
10. Priority Service feature code,
11. Priority Service supported during intersystem roaming,
12. Priority Service supported during intersystem handover,
13. Priority Service call detail record.

Three primary 3GPP capabilities were identified, including:

1. Service Accessibility,
2. Enhanced Multi-Level Precedence and Pre-emption (eMLPP),
3. Subscriber Identity Module (SIM) Specifications.

The following table summarizes the mapping of the high-level requirements to 3GPP Specifications:

Table 1: Mapping of High-level Priority Service Requirements to 3GPP Specifications

High-level Requirement	**Specification**			
	3G TS 22.011, Service Accessibility	3G TS 22.067, 23.067, 24.067, eMLPP	3G TS 11.11, SIM	3G TS 08.08, 25.413
R.1 – Priority Call Origination	√ (= Supported)	√	√	√
R.2 – Priority Call Termination	√	√	√	√
R.3 – Priority Progression	NS (=Not Supported)	√	NS	NS or VS (=vendor specific)
R.4 – Priority Queuing	NS	PS (= Partially Supported)	NS	VS
R.5 – Priority Level and PIN	PS	PS	PS	VS
R.6 – Invocation on Demand	NS	√	PS	VS
R.7 – Applicable to voice and data	√	√	√	√
R.8 – Authorized by Subscription	√	√	√	VS
R.9 – Authorized by PIN	NS	NS	NS	VS
R.10 – Priority Service feature code	NS	PS	NS	VS
R.11 – Priority Service supported during intersystem roaming	PS	√	PS	NS/VS
R.12 – Priority Service supported during intersystem handover	NS	PS	NS	√
R.13 – Priority Service	NS	√	NS	VS

call detail record				

Based on the analysis in this Feasibility Study, most of the high-level requirements for Priority Service can be supported through the use of Access Control, eMLPP, A/Iu Priority element, and SIM-based capabilities. The "authorization by PIN" requirement could be supported by a handset-based solution and not a network-based solution.
[Editor's Note: should we include a section on recommendations for CRs/new work and/or liaisons to other 3GPP subworking groups?]

Annex A (Informative): Regional Priority Service Requirements

Annexes are labeled A, B, C, etc. and are "informative" (3G TRs are informative documents by nature).

United States Regional Requirements

For the United States, the top 5 priority levels are described in table 1.

Table 1: Priorities for NS/EP Users

Priority Level	Responsibility	Qualifying Criteria
1	Executive Leadership and Policy Makers	Users who qualify for the Executive Leadership and Policy Makers priority will be assigned Priority 1. A limited number of CMRS technicians who are essential to restoring the CMRS networks shall also receive this highest priority treatment. Wireless carrier may assign Priority 1 to its technicians with operational responsibilities.
2	Disaster Response / Military Command and Control	Users who qualify for the Disaster Response/Military Command and Control priority will be assigned Priority 2. Individuals eligible for Priority 2 include personnel key to managing the initial response to an emergency at the local, State, regional and Federal levels. Personnel selected for this priority should be responsible for ensuring the viability or reconstruction of the basic infrastructure in an emergency area. In addition, personnel essential to the continuity of government and national security functions (e.g., conducting international affairs and intelligence activities) are included.
3	Public Health, Safety, and Law Enforcement Command	Users who qualify for the Public Health, Safety, and Law Enforcement Command priority will be assigned Priority 3. Eligible for this priority are individuals who direct operations critical to life, property, and maintenance of law and order immediately following an event.
4	Public Services/ Utilities and Public Welfare	Users who qualify for the Public Services/Utilities and Public Welfare priority will be assigned Priority 4. Eligible for this priority are those users whose responsibilities include managing public works and utility infrastructure damage assessment and restoration efforts and transportation to accomplish emergency response activities.
5	Disaster Recovery	Users who qualify for the Disaster Recovery priority will be assigned Priority 5. Eligible for this priority are those individuals responsible for managing a variety of recovery operations after the initial response has been accomplished.

Note: For US networks, these 5 priority levels are assigned by Office of the Manager, National Communications System (OMNCS) to key National Security and Emergency Preparedness (NS/EP) personnel in leadership positions.

In addition, the following Use Cases have been identified:
(Editor's Note: Review the use of PINs)

1. Priority Service should be ubiquitous. This requirement means that any authorized user should be able to make a priority call using any Mobile Station (MS) and that the authorization is "tied" to the user and not the MS.

    a. If, in the short term, having a special MS expedites the fielding of this service, this is an acceptable approach for initial service. However, if the device contains the authorization, there must be a user-involved authentication (e.g., PIN) to prevent misuse or abuse by an un-authorized person.

    b. Initial service might have technology dependent implementations that include differing invocation sequences and man-machine interfaces (MMI). While this might be acceptable in the short-term, a migration needs to be planned to achieve a uniform invocation sequence and a single MMI that supports the ability for any authorized user to invoke priority service on any MS, regardless of technology.

    c. The priority service user should authenticate once for each session. Authentication should be user friendly and will be used for accountability purposes. Authentication might be used for billing

purposes. Methods of authentication might include a PIN, a credit-card-like “swipe”, or voice recognition.

d. The concept of using a credit card-like dialing sequence (Dial a specific prefix, enter a credit card and the destination number) for service authentication and billing is acceptable.

2. The user should not have multiple telephone numbers, but rather the ability from one MS with which he/she is able to make priority and non-priority calls on a call-by-call basis. The user should have a user-friendly MMI and/or invocation mechanism to initiate and authenticate a priority call.

   a. The MMI could offer the ability to place the MS into a “Priority Service” mode or profile. During this timeframe, all calls placed from that MS are provided priority treatment. The user would then have to change “profiles” from priority to normal subscription.

   b. The MMI could also easily allow the user to invoke priority service on a call-by-call basis. Prompts might be required to get the user to enter a PIN, authentication, or destination number, if necessary..

3. The user needs to make a voice call in a congested area (due to either increased call volume or infrastructure damage). The user invokes priority service and authenticates.

   a. If end-to-end resources are available, the call proceeds as normal.

   b. As the user attempts to place the call, the network recognizes the user as a priority service subscriber that has requested priority service and allocates network resources to this special user first before servicing other non-priority subscribers. If priority service users of different priority levels attempt to place a call simultaneous, then the user with the higher priority is serviced first by the network, followed by lower priority users, then non-priority subscribers.

   c. If network resources are not immediately available, the network places the priority service subscriber in queue for the next available resource. The queue is managed by priority level and (within each level) time of entry into the queue.

   d. The network provides feedback to the priority service subscriber (either tones or short messages) on the status of their call (e.g., authenticating, queuing, dropped from queue, completing).

   e. The user needs the ability to call with priority other mobile (3G and non-3G) subscribers, PSTN subscribers, and in the future, IP voice subscribers, regardless of their priority status. (Mobile to mobile, mobile to PSTN, and mobile to IP-device).

   f. If, in the case of the US, users need the ability to interwork with GETS, a PSTN service. Since GETS has only one priority level, priority levels need to be mapped and supported so that a GETS call gets priority origination, treatment, and termination across the wireless networks (i.e., across the air interface) and WPS calls gets mapped and supported into the PSTN.

   g. With the current architecture, dissimilar wireless networks connect via the PSTN and not directly with each other. The PSTN is therefore responsible for “translating” priority service indicator(s) for all types of wireless networks.

4. The user needs data services in a congested area (due to either increased call volume or infrastructure damage).

   a. The user needs to send priority and receive priority short messages. The user should have the ability to reject or accept the message. Again, the initiator sets the priority level of the session.

   b. The user sends/receives e-mails, voice-mails, fax etc.

   c. The user needs to query on-line databases and make a transaction (e.g., buy blankets, cots, water, etc).

d. The user needs to make a secure telephonecircuit-switched data call (using COTS secure handsets, e.g., Motorola Sectera GSM phones).

5. Call Detail Records and Billing Issues

a. In the service provider's billing statement, the user should be able to see/verify each priority call attempt and result (duration if successful, and a reason for termination if unsuccessful).

Annex B (Informative): From ITU-T Recommendation E.106, International Emergency Preference Scheme (IEPS)

ANNEX A
(to Recommendation E.106)

Features and techniques to enhance call completion

The features described in this Annex may be used separately or in combination to create favourable conditions for the successful completion of calls, but IEPS is not necessarily dependent on them. The list is not exclusive and the use of these features is to be determined by each nation, having regard to the capabilities of networks being used.

No.	Essential features for IEPS	Feature requires call marking
1	Priority dial tone - wireline or wireless connections (Essential Line Service)	No
2	Priority call setup message through signalling network with call identifier (HPC identifier)	Yes
3	Exemption from restrictive management controls, such as call gapping (Exemption from RNMC)	Yes

No.	Optional features (F) and techniques (T) to enhance call completion	Feature requires call marking
4	Survivable access and egress from end user location to PSTN/ISDN: (F) a. Local exchange bypass; (T) b. Diverse PSTN/ISDN access from cellular; (T) c. Prescription override; (T) d. Avoidance routing; (T) e. Diverse routing; (T)	
5	IEPS user verification (F)	Yes
6	Special announcements on call progress (F)	Yes
7	Special routing capabilities (F) a. Enhanced alternate routing; (T) b. Trunk queuing; (T) c. Off-hook trunk waiting; (T) d. Dynamic trunk reservation; (T) e. Trunk sub-grouping; (T) f. Automatic call rerouting; (T) g. PSTN/ISDN partitioning. (T)	 Yes Yes Yes Yes Yes No No
8	Call forwarding (F)	Yes
9	Abbreviated dialling (F)	No
10	Attendant override (F)	Yes
11	Authorisation codes (F)	No
12	Automatic call distribution (F)	No
13	Call-by-call service selection (F)	No
14	Call pickup (F)	No
15	Call transfer (F)	No
16	Call waiting (F)	No
17	Calling number identification (F)	No

DESCRIPTION of above features and techniques

1 Priority Dial Tone

A service arrangement that enhances the ability of IEPS users to receive priority over other users for the reception of dial tone. This is a restrictive treatment of non-IEPS users. Note that access denial systems are an extreme form of restrictive treatment, providing dial tone to permitted lines only. Call attempts from such designated lines are placed in a priority queue and are handled before non-IEPS calls.

2 Priority call setup message through national and international signalling network with call identifier

This is a method of marking and identifying IEPS calls through networks. As the IEPS call progresses through the networks, this identifier would enable special routing and preferential treatment to ensure the higher probability of call completion.

3 Exemption from restrictive management controls

A set of control measures used to prevent or control degradation of network service. These measures are either expansive or protective. Expansive measures increase call routing choices by providing more capability than normal to carry excess traffic. Protective measures limit calls going into a switch or trunk group.

4 Techniques that enhance survivable access from the end user to the PSTN/ISDN are described in 4.a to 4.e

4.a Local exchange bypass

The use of direct access services to or egress services from Switched Networks by using either bulk, wide-band, switched, point-to-point, or circuit-by-circuit services. These services are available from providers such as cellular service providers, specialised service providers and satellite service providers.

4.b Diverse PSTN/ISDN access from cellular

This technique allows cellular networks to directly interconnect with other elements of PSTN/ISDN. This allows cellular calls to be routed around failed or congested nodes. Network access diversity allows specifically identified calls to be routed to private or special purpose networks.

4.c Prescription override

The ability to select an alternative carrier, e.g. by dialling a specific code or operating a selection key on the terminal instrument.

4.d Avoidance routing

This technique, with limited availability, permits a user to enhance their survivability in PSTN/ISDN by directing the service provider to assign them to transmission facilities that avoid points of vulnerability such as earthquake zones or hurricane areas.

4.e Diverse routing

This technique provides the user with a second route over physically separate facilities which can be used if the primary route is unavailable.

5 IEPS user verification

This feature allows for the verification of the IEPS user. Personal Identification Numbers (PINs), line identification, authorisation codes or call back facilities could be used to verify the call as an authorised IEPS call.

6 Special announcements on call progress

This feature will provide recorded voice announcements for originated call to announce information to the user when calls cannot be completed or to provide problem and restoral information.

7 Special routing capabilities that enhance call completion are described in 7.a to 7.g

7.a Enhanced alternate routing

Routing programs are used to provide special routing controls and paths within a network.

7.b Trunk queuing

This technique would hold the IEPS call in queue until a trunk became available, then the first call in queue (the IEPS call) would have access to the next available trunk. The IEPS call would not receive an immediate “all trunks busy” tone.

7.c Off-hook trunk waiting

This technique allows the IEPS caller to remain off-hook and the network continually searches, at predetermined intervals (i.e. several seconds) for an idle trunk if no idle trunk was found on the initial attempt.

7.d Dynamic trunk reservation

This technique automatically reserves reservation of trunks for certain classes of calls under designated conditions. It could be implemented or activated in the following ways:

- IEPS calls could be allocated a variable number of trunks between switches according to demand;
- the use of network management control under predetermined conditions, to reserve trunks in an idle condition for the exclusive use of IEPS calls; and
- the designation of specific sub-groups within a trunk group that, under predetermined conditions would be reserved for IEPS calls.

7.e Trunk sub-grouping

This technique splits trunks into pre-assigned sub-groups; one for general use and another for IEPS use only. Under normal conditions general use traffic could use either sub-group. During emergencies only IEPS calls would use the IEPS sub-group. Overflow from the IEPS sub-group could be routed over the general use subgroup but the general calls would not be allowed to overflow to the IEPS sub-group.

7.f Automatic call re-routing

This technique allow calls to be routed over other operator's networks.

7.g PSTN/ISDN partitioning

This is the use of hardware or software to separate traffic into specific functional groups for the purpose of providing special service capabilities such as enhanced call completion for IEPS calls.

8 Call forwarding

A feature that enables calls to be rerouted automatically from one line to another or to an attendant.

9 Abbreviated dialling

A feature by which a user can attempt a call by dialling a two or three digit code that instructs a database to obtain the actual desired number from a look-up table and transmit it into the network to connect the calling line to the called line.

10 Attendant override

A feature that allows the terminal equipment operator to interrupt a call that is in progress.

11 Authorisation Codes

Unique multi-digit codes used to allow an authorised user privileged access to a network, system or device. If the code is validated the call is allowed to advance.

12 Automatic Call Distribution

A system designed to evenly distribute traffic by directing incoming calls over a group of terminals.

13 Call-by-call service selection

A feature that provides improved trunking efficiency between end-user location and end-office by allowing a variety of services to use the same trunk group and by distributing traffic over the total number of available trunks on a call-by-call basis.

14 Call pickup

A feature that enables a connected extension to answer any ringing extension within an assigned call pickup group.

15 Call transfer

A feature whereby a call to a user's number is automatically transferred to one or more alternative numbers when the called number is busy or does not answer.

16 Call waiting

A feature that provides a distinctive audible tone to a busy user's line to notify the user when another caller is attempting to reach his/her number.

17 Calling Number Identification

A feature that provides the identification of the calling user's number by means of a visual or audible identification at the called terminal.

Annex C (Informative): From DRAFT ITU-T Recommendation F.706, International Emergency Multimedia Service (IEMS)

Core IEMS Functions

The network topology over which the IEMS operates is depicted in Figure 2. This figure is divided into three basic parts representing the national network of the user initiating the IEMS communication, the national network of the intended recipient or recipients of the IEMS communication, and the international connection that lies in between. The core IEMS service operates between the designated IEMS access points to the communicating national networks in accordance with the operational agreements established between the Administrations involved.

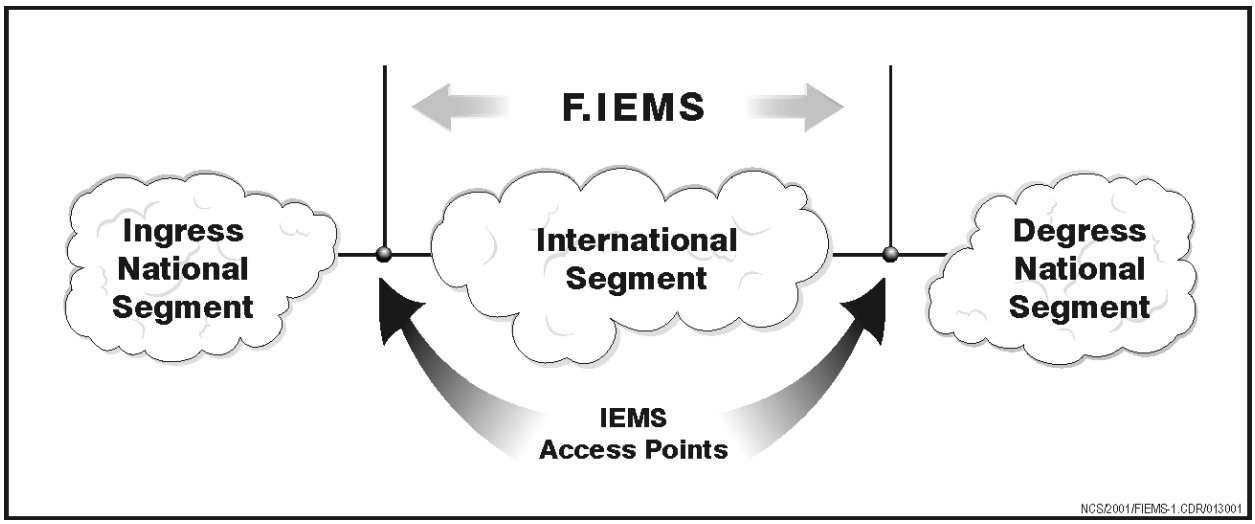

Figure 2: The IEMS Core Topology

The core IEMS service provides two basic service capabilities. These include a means for identifying and authenticating IEMS traffic requiring priority treatment, and the protocol mechanisms and routing procedures required by the service provider to offer a particular IEMS service feature.

IEMS Traffic Identification

IEMS traffic is identified by a special marking mechanism, or differentiated services codepoint, that will trigger specific actions by network elements in accepting, transmitting, and delivering the traffic on a priority basis. This marking mechanism consists of a basic part that provides a rapid and reliable method for separating IEMS traffic from non-IEMS traffic within a particular traffic flow. There is also a supplementary part that provides a means for selecting and managing different levels of quality and service urgency. As a minimum, the supplementary part should support the following differentiations:

Media: a means for distinguishing between voice, video, and data components of a multimedia communication in which these components may have a different relative importance. This may be particularly desirable during periods of congestion to reduce the bandwidth requirement, but still retain the essential essence of the communication.

Precedence: a facility for identifying multiple precedence levels for use in specifying the relative importance of a particular IEMS communication with respect to other IEMS traffic competing for the same network resources. The number and types of precedence levels required are a subject for further study.

Category of User: in certain situations, it may be more desirable to differentiate IEMS traffic by the category of user (e.g. diplomatic, medical support, police, etc.) rather than by the precedence designator assigned by the message initiator.

The process of prioritization will vary depending on the extent to which the network is impaired and whether some type of multi-level priority scheme has been invoked.

IEMS Access Control and Authentication

Access to the IEMS may be initiated through either an analog or digital network connection. In either case, the IEMS End-user provides the call marking information required for IEMS access and processing across the networks involved.

One or more of the following access control options is applied to the offered call to assure that only authorized users are permitted access to the IEMS:

a) **Access via pre-determined lines**: This option reduces the possible misuse of the IEMS, but is not portable;
b) **Access by means of special code** (such as a Personal Identification Number (PIN)) at any available PSTN/ISDN or Internet service provider interface: This option provides more flexibility of access and would involve additional technological and operational provisions. The allocation and control of IEMS/IEPS user PINs would require the establishment of appropriate administrative control database management procedures;
c) **Access from a protected national emergency network:** This option assumes that the initiating national network provides a "trusted" level of access acceptable to the other Administrations involved.

It is likely that call restrictions to certain specific destinations (e.g. country codes, area codes, IP-addressing subsets, etc.) will already be in place when IEMS is activated. Such restrictions should not apply to IEMS users between countries that have a common IEPS arrangement when that arrangement has been invoked.

If sufficient resources are no longer available, the ability to make calls is removed from non-IEMS users, while the ability to receive calls is not affected. All calls then made by an essential IEMS/IEPS user should still be permitted. Pre-emption of existing non-IEMS communications may be applied optionally in countries and networks where pre-emption is allowed. The concept of how pre-emption is to be applied in a connectionless packet network environment is a subject of further study.

Network Routing and Associated Service Features

IEMS network services should guarantee priority handling for the traffic of designated users, and exemption from restrictive network management controls. The process of prioritization may vary depending on the extent to which the network is impaired, and there may be more than one level or type of priority designation.

Recognizing that different circumstances may require different service features, a particular IEMS service offering may consist of one or more of the following service components:

- Priority network access;
- Guaranteed network access (equivalent to “off-hook” service in the PSTN);
- User validation and authentication;
- Priority routing and queuing for network resources;
- Enhanced alternate routing capability (not available for general public use);
- Node, network, and service management;
- Centralized service management and billing;
- Call redirection;
- Priority call indication;
- Multiple priority levels;
- Pre-emption of non-IEMS traffic optionally, where allowed and when needed;
- Caller location for mobile calls.

IEMS will cover a broad range of multimedia services, with enhanced capabilities, that will significantly benefit emergency operations for IEPS/IEMS users. These include, for example:

a) Web access
b) Instant messaging
c) Remote printing
d) Email
e) File transfer
f) Wireless Access
g) Broadcast/multicast audio/video/data
h) Interactive video
i) Remote database
j) DNS lookups

All of these services could be considered for preferential treatment, authorization, and administration for IEPS/IEMS requirements.

For circuit-switched PSTN and ISDN, priority routing and processing of IEPS emergency communications as identified in Recommendation E.106 are only necessary during call setup. However, when dealing with IEMS emergency communications over a packet-based, connectionless network service, priority routing and processing of IEMS communications must be maintained for the full duration of the emergency communication.

While only authorized users can initiate an IEMS services, the recipient can be any other user, whether IEPS/IEMS designated or not. To ensure that an IEMS user can reliably call any other user, call-barring or similar facilities that can normally be set for a called party should be overridden. Priority calls to a number where a "call transfer" or "call forwarding" feature has been invoked should retain the priority designation and the marking indicator passed on to other telecommunications providers that may be involved.

During emergency situations, priority control of a connection-less type of communication may require additional considerations. The introduction of a data management scheme such as "metadata" may be necessary to indicate that the emergency information needs to be processed according to its specified IEMS priority. Data management schemes such as "metadata" can facilitate priority control by specifying the type of emergency and importance of the information. Moreover, by using a standardized data management scheme, mutual exchange and effective use of the emergency information are achieved.

IEMS services should not impose any special or additional equipment constraints on the end user, and should always provide for a basic level of operational capability between the circuit-based IEPS and packet-based IEMS user communities.

Traffic Classes

When traffic conditions degrade to a predetermined level of service, priority routing features are invoked and remain in force until traffic conditions return to an acceptable level. In order to facilitate routing through the network during periods of stress, IEMS communications can be divided into three basic classes depending on the amount of processing required by the network:

CLASS 1: a single packet communication (48bytes of payload or less).

CLASS 2: a single media, multiple packet communication (or a multimedia communication in which each media is of the same relative importance).

CLASS 3: a multimedia, multiple packet communication in which each media may have a different relative importance, and thus assigned different priorities in a multi-level priority scheme.

Interworking

ITU-T Recommendation E.106 provides an International Emergency Preference Scheme (IEPS) for application by authorized users of the circuit-switched International Telephone Service (ITS) defined in Recommendation E.105. Interworking between the IEPS and IEMS environments is required at a level supportable by the ITS, and is to be provided in accordance with the service principles established in E.370. This includes defining a means for handling the IEPS indicator in the IP-based environment.

The features identified in E.106 that could enhance call completion in a circuit switch network are summarized in Table A. The use of specific features will be determined by each nation after due consideration to the capabilities of the networks available for use.

For those new or enhanced IEMS features that can only be supported within a packet-based network environment, provision should be made for a fallback mode that will still allow effective communication between the IEMS and IEPS user communities.

Operational Management

IEMS users are determined by national governments and may include activities such as local emergency services (police, fire department, etc.), public utilities, medical services, and diplomatic or other vital government interests.

Requests for enabling the IEMS are to be coordinated between the countries involved. In each country, the national authority responsible for making such arrangements will establish and authenticate the authorized IEMS user list. At the onset of a crisis situation wherein IEMS is invoked, the national authority in the affected country will need to confirm the preference status of calls from essential users in those countries with which agreements have been made.

Emergency situations requiring support from IEPS/IEMS communications capabilities can occur anywhere at anytime. Interchange of IEPS/IEMS service management information (e.g. trouble reports) may be required between TMNs (see Recommendation M.3010). The means of access to service management information needs to be flexible and simple.

The priority handling procedures to be assigned to each traffic class, category of user, media component, or precedence level will be assigned based upon agreements made in advance by the Administrations involved, and reconfirmed at the time an IEMS agreement is invoked.

While several countries already have emergency service capabilities within their own national network, it is important to have common procedures in place during international crises in order to allow communications between essential users in the affected countries. In order to be responsive to both national and international interests, these two capabilities need to be considered as independent, but fully compatible.

Only those users of a national emergency service scheme that have a legitimate part to play in a particular international crisis should be eligible for priority access to other IEMS participating networks. On the other-hand, users that are authorized access to an international priority service will require access to this service through their own national system. Under conditions of severe local damage or congestion, countries need to retain effective control over their own national networks, particularly with respect to incoming traffic, even though an international priority scheme may have been invoked.

Annex D (Informative):
Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Oct 12, 2001								First draft from document S1-PS-010006		0.0.0	Priority Services
Oct 26, 2001								Draft from document S1-PS-010010		0.0.1	Priority Services
November 2001		S1-011094						Draft from document S1-011094		0.0.2	Priority Services
December 2001								Draft from document S1-Priority-010016		0.0.3	Priority Services
January 2002		S1-020214						Draft from document S1-020214. Update of S1-Priority-010016 and S1-Priority-010017		0.0.4	Priority Services
February 2002		S1-020218						Update of S1-020214, incorporating S1-020215, S1-020216, and S1-020217		0.0.5	Priority Services
February 2002		S1-020592						Update of S1-020218 incorporating S1-020354, S1-020394 and other comments raised during the February 2002 meeting 3GPP SA1		0.06	Priority Services