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FFFIS for MULTIPLE DRIVER COMMUNICATION

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EVOLUTION SHEET

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A	17.09.96	KAPSCH	first draft
B	16.10.96	KAPSCH	VGCS removed, UUS added
C	10.11.97	KAPSCH	changes agreed on review (UUS removed)
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1 SCOPE

This **Form Fit Functional Specification** (FFFS) specifies the function required from the GSM-R network for **multiple driver communication** in different locomotives on the same train. For this item there is no additional **Functional Interface Specification** (FIS) necessary. Formally the FIS is included herein (FFFIS).

When the train equipment provides local connections between different drivers no interaction to GSM-R is necessary, except that it should be possible to receive incoming calls concurrently.
Therefore this case is not described here.

Where there is no wired local connection, it is necessary to establish radio connections between each of the active cabs.

No explanations on standard GSM procedures are made. For details refer to GSM recommendations.

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2 REFERENCE DOCUMENTS

[1] EIRENE Draft System Specification v9.0 AA385D011 14. July 97
[2] MORANE SSRS v2.0 19. March 97

ETSI:

[3]	GSM 02.84	MPTY Stage 1 (Multi Party Supplementary services)
[4]	GSM 03.84	MPTY Stage 2
[5]	GSM 04.84	MPTY Stage 3
[6]	GSM 02.83	CW,HOLD Stage 1 (Call Waiting, Call Hold)
[7]	GSM 03.83	CW,HOLD Stage 2
[8]	GSM 04.83	CW,HOLD Stage 3

3 TERMINOLOGY AND ABBREVIATIONS USED

EIRENE	European Integrated Railway Radio Enhanced Network
ETSI	European Telecommunications Standard Institute
ETSI-GTS	ETSI - GSM Technical Standard
GSM	Global System for Mobile communications
MORANE	Mobile Radio for Railway Networks in Europe
SSRS	Sub System Requirement Specification
3PTY	Three Party call (ISDN)
CONF	Conference call (ISDN)
CW	Call Waiting
FFFS	Form Fit Functional Specification
FIS	Functional Interface Specification
HOLD	Call Hold
MPTY	Multi Party (Conference)
MPTY-SS	Multi Party Supplementary services
P-T-P	Point-to-Point
SS	Supplementary Service
MPTY manager	served subscriber (for MPTY)
Served subscriber	served subscriber (for MPTY) in this document
Active driver	driver who controls a locomotive
Primary driver	driver in the front leading locomotive

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4 MAIN CONCEPTS

In trains with more than one tractive vehicle it may be useful to have speech connection between all active drivers. If no local lines are provided in a train, GSM radio connections can be used. In some typical geographical areas (mountains, stations) sometimes, this 'pseudo-local' link is established as long as the train's journey lasts. This function is directly related to shunting type operation.
Additionally all drivers must remain within reach for other calls.

4.1 Normal P-T-P CALL plus MPTY

In the case of two drivers a normal point to point connection can be established. In the case of more than two drivers the GSM Multi Party Supplementary Service (MPTY) can be used.
As MPTY-SS is a standard GSM feature no further explanations are made in this paper. For details refer to GSM recommendations.

5 GENERAL ARCHITECTURE

5.1 Normal P-T-P CALL plus MPTY

The nature of MPTY-SS leads to some peculiarities for the users, especially in combination with other services. In the following, typical call scenarios are described to determinate which combinations or restrictions are of concern for the usage.

5.1.1 Distinction between normal call and MPTY call

For a normal point-to-point connection there is no functional distinction between originator and called party (apart from charging which is not of concern for drivers).

In a MPTY call there are two types of participants the so called **served subscriber**, the one who initiates the MPTY and the **remote parties**. The latter theoretically does not need to have subscription to MPTY service.

5.1.2 Limitations of MPTY calls

One served subscriber can handle a maximum of five remote parties. Every remote party himself could be a served subscriber for another five remote parties. (Refer to GSM 02.84,§1.2.1,§1.6.84.1).

For the envisaged use in multiple driver communications this limitations are not of concern, because a maximum number of 5 participants is more than sufficient.

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5.1.3 Additional necessary provisions to invoke MPTY-SS

Provision for using MPTY is the additional subscription of the Call Hold / Call Wait Supplementary Service (Refer to GSM 02.84,§1.3.1).

5.1.4 Distinction between served mobile subscriber and remote parties

In the usage of the service the consequences are some slight differentiation concerning the parties :

- Notification to the served subscriber is different to the remote party when the call state changes.
  When a remote party puts his MPTY leg on hold or disconnects his MPTY leg a notification is sent to the served subscriber but not to the other remote parties.

- When a MPTY with the maximum number of participants is ongoing, it is possible to add to the MPTY an additional call if the new call was routed to one of the remote parties. But it is not possible if the new call was routed to the served subscriber.

Following the EIRENE Specification, MPTY calls shall be invoked by the primary driver. This has to be regulated by the railway companies.
But in any case the network is not able to check this.

5.1.5 Interaction with other services

5.1.5.1 Ongoing MPTY plus P-T-P Call

If the served subscriber is notified having another call waiting he has the possibility to ignore the other call, to put the MPTY on hold or release the MPTY. This is notified to all remote parties. The additional call can be treated as all previous calls forming the MPTY (release the call or add it to MPTY if the maximum number is not exceeded).
If one of the remote party is notified having another call waiting the same procedure applies, with the difference that only the served subscriber is notified if this leg of the MPTY is put on hold or released.

5.1.5.2 Ongoing MPTY plus Group Call or Broadcast Call

Every participant of the MPTY call within the group call area who accepts an incoming group call leaves the MPTY call. For the remaining members of the MPTY call outside the group call area the notification rules as defined in GSM-Specification 02.84 apply.
If the served subscriber accepts an incoming group call the MPTY call is released entirely.

The above applies to broadcast calls respectively.

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5.1.5.3 MPTY and functional number

No interaction because normal call procedures apply.

5.1.5.4 MPTY and presentation of functional numbers

No interaction because normal call procedures apply.

5.1.5.5 Interworking with ISDN

ISDN 3PTY and CONF shall be mapped to GSM MPTY,
GSM MPTY to ISDN CONF. (Refer to GSM 02.84).

5.1.5.6 Interworking with PSTN (non ISDN type)

Possibly no notification when call state changes (Refer to GSM 02.84).

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