

## VIRVE Network Requirements for Hand Portable and Mobile Terminals





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Guidelines of the Finnish Transport Agency 17/2016

Finnish Transport Agency  
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## VIRVE Networks Requirements for hand portable and mobile terminals Guidelines of the Finnish Transport Agency 17/2016

These guidelines on the acquisition of TETRA mobile terminals are valid as of 1 October 2016. The guidelines apply to mobile terminals used in railway communications in the VIRVE network. They are related to TRAFI's national regulation TRAFI/26490/03.04.02.00/2014 on the railway communications system.

The guidelines and regulation by TRAFI ensure the compatibility of mobile terminals used in railway communications with the VIRVE network, particularly the properties of cabin mobile terminals and their antennae, to ensure that verbal communication between traffic control and train operators is as reliable as possible.

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## Foreword

VIRVE Networks and Railway Communications Requirements for hand portable and mobile terminals constitute the first separate guideline of the Finnish Transport Agency which assists in the acquisition of TETRA mobile terminals intended for use in railway communications. The objective of these guidelines is to ensure the compatibility of mobile terminals with the VIRVE network and that such terminals have the necessary minimum functionalities required in railway communications.

The guidelines are based on the experiences of State Security Networks Ltd of mobile terminals available on the global market. Since TETRA technology, specifications, networks and mobile terminals are still being developed, these guidelines must be updated from time to time so that new features that support railway communications and compatibility with the VIRVE network can be considered in the acquisition of mobile terminals.

The work group in charge of preparing the guidelines included Markku Voutilainen of the Finnish Transport Agency, Peteveikko Lyly, Harri Hildén, Harri Virtanen and Ilari Hatakka from State Security Networks Ltd, and Esa Mäkelä from VR Goup Ltd. In addition, experts from manufacturers of TETRA mobile terminals (Airbus Defence and Space, Hytera, Motorola and Sepura) commented on the requirements and their necessity.

Helsinki, September 2016

Finnish Transport Agency  
Traffic and Information

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## 0. General requirements

For each referred TIP document it is stated whether the support is mandatory, conditional or optional. All requirements under each TIP chapter are mandatory unless stated as optional.

TETRA Interoperability Certificates may be used as proof of compliance.

### 1. TTR 001-TIP part 1 Core (Mandatory)

The offered radio terminal shall be TETRA Association IOP certified in compliance with the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document. Certificate of the test done with newer version of System Release is acceptable if the test case is unchanged.

#### 1.1 Registration

The offered radio terminal shall

	TETRA IOP Test Case Number (if available)
	IOP001-01 Ver 3.1.0
perform ITSI-Attach registration at power on	tests 1.1, 1.7
perform roaming location updating when LA changes	test 1.5, 1.6
support infra initiated location updating	tests 1.3.1
perform periodic location updating after LA timer expires as specified in EN300392-2 (periodic registration)	Test Case 1.5, /2. After a couple of minutes (well before LA timer expires) MA A is roamed to LA2 by attenuating serving cell.)
shall perform deregistration (ITSI detach) before powering down	Test Case 1.4.

support Subscriber Classes offered within the registration (in any D-LOCATION UPDATE ACCEPT PDU)	Subscriber Class procedures 11.1.1, 11.2.1, 11.2.2, 11.2.2_step5/6, 11.3.1, 11.3.2, 11.3.3, 11.4.1, 11.4.2, 11.4.3	
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**1.1.1 Optional Registration features**

support up to 3 Secondary Common Control Channels (SCCH)	Common Secondary Control Channels  12.1, 12.2, 12.6, 12.7  11.3.1, 11.3.2, 11.3.3  11.4.1, 11.4.2, 11.4.3	Optional
support temporary registration during base station fallback	BS Fallback Operation  13.1.1, 13.1.2,  13.2.2, 13.4.2, 13.4.3, 13.4.5	the radio terminal shall re-register when "system wide services" become available

**1.2 Individual call**

The offered radio terminal shall

	TETRA IOP Certificate, Test Report, Test Case  IOP001-01 Ver 3.1.0
support pre-emptive priority call services and pre-emptive speech item	Pre-emptive Priority Call  3.10, 3.11, 4.1.7, 3.9, 4.1.6  test case 4.1.6, 4.1.4
support DTMF signaling to PSTN/PABX	PSTN Interconnect / DTMF over-dial 8.4

**1.2.1 Optional Individual call features**

	TETRA IOP Certificate Test Case
support PTT request queuing and PTT request pre-emption	Already as part of Pre-emptive Priority Call
support PSTN/PABX call priority modification to emergency priority	PSTN Interconnect / Emergency Telephony calls  6.3.1, 6.3.2
support imminent call disconnection (with UI) as specified in TTR001-01	4.1.13 (imminent disconnection with UI) (This is originally mandatory for all VIRVE-terminals but due to lack for support among manufacturers, modified to be optional)

**1.3 MS-ISDN Numbering**

The offered radio terminal shall

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
support MS-ISDN numbering for dialling in individual calls, status messages and SDS	MS-ISDN Numbering  9.1.9.2
support MS-ISDN numbering as calling/talking party identified in group and individual calls, status messages and SDS	9.3.9.4

## 1.4 Group management

The offered radio terminal shall

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
<p>support attachment of selected group</p> <p>support attachment of multiple scanned groups</p> <p>support null group attachment (no group selected)</p> <p>support radio terminal initiated group detachments (test 2.3.1)</p> <p>support SwMI initiated group detachment/attachment or any group</p>	<p>2.1.2, 2.1.4, 2.1.5, 2.1.6, 2.1.7, 2.1.8, 3.8.1, (single)</p> <p>2.2.1, 2.2.2, 2.2.3, 2.2.5, 2.1.7, 2.1.8, (multiple)</p> <p>2.3.1, 2.3.2, (ms initiated)</p> <p>2.4.2, 2.4.3, (SwMI initiated)</p>
<p>support different attachment lifetimes</p>	<p>test 1.3.1 /clause 1.</p> <p>published test case says reattachment is (only) needed if the lifetime was "Attachment for next location update required"</p>
<p>attach any group (GSSI) before using it for reception or transmission</p> <p>It shall not be possible to program the radio terminal not to make the attachment.</p>	<p>Explanation: It shall not be possible to program radio not to make attachment prior to using group for reception or transmission.</p> <p>Requirement means you must never do 'passive attachment',</p>
<p>support scanning on/off indication using U-MM STATUS PDU</p>	<p>MS shall support scanning on off , referring to test case 2.1.7, /clause 2. If MS supports Scanning ON/OFF</p> <p>VIRVE requires MS shall support sending of scanning ON/OFF indication</p>
<p>support different detachment reasons</p>	<p>test cases 2.1.5, 2.1.6, 2.3.1, 2.3.2, 2.4.3, 3.13, 2.4.2</p>
<p>use CoU Always Scanned value for background groups</p>	<p>test cases 2.1.7 and 2.1.8</p>

support SwMI initiated group reporting	partially covered in test 1.3.2
re-negotiate group settings and scanning status when it returns under normal network coverage, if there has been a change in group settings during fallback mode	test 13.1.2

## 1.5 Group Call

The offered radio terminal shall

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
support temporary address assignment support broadcast calls shall support priority group scanning	3.1, 3.3, 3.4, 3.6, 3.13, 3.14, 3.2 (late entry) 3.8.1, 3.8.2, 3.8.3 (priority group scanning)
follow D-RELEASE PDU with original group address even when temporary address is used	This seems not to be part of TIP test cases but however it is VIRVE requirement
support PTT request queuing and PTT request pre-emption	test 3.4, 3.9
support call priority modification (pre-emptive to non-pre-emptive or vice versa)	tested in 3.9

### 1.5.1 Optional Group Call features

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
support modification of a normal group call to a broadcast call	optional
support SwMI initiated authentication during location updating	optional partially tested in 13.1.3

## 1.6 Emergency call

The offered radio terminal shall

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
Pre-emption of resources and support individual and group emergency calls	6.1.2, 6.2.1 6.1.1
Pre-emption of busy users	6.1.3, 6.2.2
Call setup modifications support emergency call disconnection (by sending U-DISCONNECT) as call owner	also 7.3.4.1, 7.3.7.2, 7.4.2, 4.1.1, 4.1.2, 4.2.1
support call ownership assignment	part of test cases and 3.6
support initiating emergency calls to emergency identity	partially in test 6.2.2 but VIRVE requires support for emergency identity as mandatory
support PTT request queuing and PTT request pre-emption	test 3.4 3.9
deliver its location (with an unambiguous timestamp) when an emergency call is initiated	implementation issue

## 1.7 Cell re-selection

The offered radio terminal shall

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
Undeclared	7.1.1
Unannounced	7.2.2, 7.2.4, 7.3.1.2 and 7.3.1.2
Announced - with Call restoration	7.2.1, 7.2.3, 7.2.5, 7.3.1.1, 7.3.2.1, 7.3.4.1, 7.4.1, 7.4.2, 7.2.8, 7.3.7.1, 7.3.7.2, 7.4.4
Announced - without Call restoration	
support all announced type cell re-selections (1-3)	
support type 1 handover for duplex calls	
support expedited handover	needed for handovers in tunnels . During call, similar to type 3 handover shall be supported.  TETRA TIP test cases 7.5.1 and 7.5.2 ,

Optional:

use cell load as cell selection criteria as specified in EN300392-2. Terminal shall select cell with lower cell load than serving cell as soon as neighbour cell is Radio usable	This feature is still under development in TIP process.
support type 1 handover for transmitting party in group calls	

## 1.8 Status messages

The offered radio terminal shall

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
support status sending to predefined destination (situation indicator)	This requirement is not related to air interface TIP.
support sending individually addressed status messages	5.1.1
support sending group addressed status messages	5.2.1, 5.2.2, 5.2.3,
support receiving individually addressed status messages	
support receiving group addressed status messages	
send Tx Inhibit On/Off message to SwMI Address (FFFFFD)	15.1.1 SwMIs, 15.1.1, curr sel gssi,

## 1.9 Layer 2 operation

The offered radio terminal shall

	TETRA IOP Certificate Test Case
support random access code A	mandatory requirement
support FACCH signalling in uplink and in downlink regardless of the opposite direction's mode (FACCH or traffic)	10.1- 10.8
support fragmentation on FACCH/SACCH uplink and downlink	10.5-10.8
support SCCH and its reassignment in any registration update	10.1-10.8

**1.9.1 Optional Layer 2 features**

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
support random access code B	<p><b>Access codes</b></p> <p><i>The TETRA standard enables the subdivision of random access opportunities by using access codes.</i></p> <p><i>The EADS TETRA System infrastructure supports the use of access codes A and B. Access code B is used by the EADS TETRA System to provide exclusive access for calls with priority level 7 ie. emergency calls. Frames with code B are used when the probability of congestion has increased.</i></p> <p><i>This feature requires that the radio terminal supports ACCESS-DEFINE PDU and access code B with priority restriction.</i></p> <p><i>The use of access code B can be deactivated with a cell-specific parameter.</i></p>
support Energy Economy modes EG 0 – EG 1	optional, User req.
support Energy Economy modes EG 2 – EG 5	optional, User req.

**2. TTR 001-TIP part 2: Short Data Services (Mandatory)**

The offered radio terminal shall

	<p>TETRA IOP Certificate Test Case</p> <p>document IOP 001-02 Ver. 2.1.0</p>
<p>shall be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document</p> <p>support sending and receiving individual and group addressed SDS</p>	1.5.1 , 1.5.2



support text message concatenation using UDH protocol as specified in EN300392-2	Protocol ID will be specified. Multipart is not required.
support sending and receiving SDS on FACCH/SACCH	10.1 – 10.8
support SDS TL	Individual Adressed: 1.4.1_8bit-Latin1 , 2.4 , 1.4.1_8bit-Lating  Group addressed : 1.4.2, 1.4.3,  MSISDN 1.4.4_8bit , 1.4.5_8bit  USC2, 1.4.6, 1.4.7, 2.1_16bit, 2.2_16bit, 2.3_16bit, 2.5_16bit
send SDS TL reports when requested	1.4.1_8bit_lating 1.4.4_xbit, 1.4.6 2.2 , 2.3 , 2.4
support store and forward functionality (sending/receiving via service centre)	2.1_8bit-Latin1, 2.1_8bit-Lating, 2.1_16bit, 2.3_8bit , 2.2_16bit, 2.3_8bit
support 7-bit and ISO/IEC 8859-1 Latin 1 text coding	2.1_8bit-Latin1, 1.4.1_8bit-Latin1

display received immediate text messages automatically without user intervention on the user interface of the offered terminals	ETSI TIP test case xx  (PID 9 & 137)
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**2.1.1 Optional Short Data Services features**

support receiving Fallback SDS and indicating it	13.4.6
support receiving of Business cards over the air	optional. User req.
support sending/receiving immediate text messaging	optional No IO test available. User req.  Explain

### 3. TTR 001-TIP part 3: DGNA (Mandatory)

The offered radio terminal shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	<b>IOP 001-03 Ver. 2.0.1</b>
support individually addressed DGNA with attachment and different assignment lifetimes	1.3, 1.4.2, 1.4.3, 1.5.1, 1.6, 1.7
support individually addressed DGNA assignment even if it already has the GSSI attached	1.5.1
support de-assignment of any group	1.7, 1.7.1, 1.7.2, 1.7.3

### 4. TTR 001-TIP part 4: Authentication (Mandatory)

The offered radio terminal shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	<b>IOP 001-04 Ver. 2.0.0</b>
support SwMI initiated authentication during location updating	1.1 – 1.3
support mutual authentication	2.1,
support encrypted TEI query	3.2CI3

### 5. TTR 001-TIP part 11: Air Interface Encryption (Mandatory)

The offered radio terminal shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	<b>IOP 001-11 Ver. 3.0.2</b>
support Security Class 2 (SCK) in Base Station fallback mode	2.6.6, 2.6.7,
support Security Class 3 (DCK) in normal mode	2.1 – 2.5

The offered radio terminal shall support CCK	2.1.2 , 2.2.1.1 , 2.2.2.1
The offered radio terminal shall request the new CCK when it receives a CCK change broadcast	2.1.1, 2.1.2, 2.2.1.4, 2.2.2.4, 2.2.3.4, 2.2.5.1, 2.5.2, 2.6.3
The offered radio terminal shall support CCK OTAR	2.5.1, 2.5.2
The offered radio terminal shall support DCK forwarding	2.2.1.4, 2.2.2.4, 2.2.3.4, 2.2.1.3
The offered radio terminal shall remember the cell's CCK over power cycle and then use DCK retrieval during ITSI attach	

## 6. TTR 001-TIP part 12: Service Interaction (Mandatory)

The offered radio terminal shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	<b>IOP 001-12 Ver 1.0.0</b>
accept group call while busy in lower priority group call (priority scanning)	1.2.2, 1.2.3, 1.2.5,
accept group call while busy in individual call	1.2.1
accept group call whilst engaged in packet data service	1.1.10
support requesting individual or group call whilst engaged in packet data service	1.2.5,

Optional

accept individual call whilst engaged in packet data service	
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## 7. TTR 001-TIP part 13: Enable/ Disable Mandatory

The offered radio terminal shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	<b>IOP 001-13 Ver 1.0.0</b>
support authentication during enable/disable signalling	2.1, 2.2_mut TEI Q, 4.1 , 4.2_mut TEI Q , 9.1 , 9.2_mut encrypt TEI Q,
support enabling/disabling targeted to TEI and ITSI	1.2. , 1.4., 5.3
support TEI query	
support roaming while temporarily disabled	"Disabled MS updating"

## 8. TTR 001-TIP part 14: TETRA Key Distribution (Mandatory)

The offered radio terminal manufacturer shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	<b>IOP 001-14 Ver. 1.0.0</b>
support Extended Model of TETRA Key Distribution	Operator requirement: electronic transfer only OR physical media, too  1.1, 1.3-1.4

## 9. TTR 001-TIP part 19: Location Information Protocol (Mandatory)

The offered radio terminal with integrated GPS receiver shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	IOP001-19 , Ver 1.1.0
support LIP over SDS	1.1
support temporary trigger control requests	1.13
support time-based reports	1.1 ,1.3 , 1.6, 1.7, 1.9, 1.10, 1.13
support distance-based reports	1.1 – 1.3 , 1.5-1.10, 1.13
support trigger modifications	1.3 , 1.9 , 1.13
support control request validity indicator	

Optional

support sending LIP messages also when temporarily disabled	
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## 10. TTR 001-TIP part 17: Radio User Assignment (Mandatory)

The offered radio terminal shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level wrt this TIP document	<b>IOP 001-17 Ver. 1.0.0</b>
support MS-ISDN and SSI as Radio User Identity types	part of core
support RUA at registration with and without PIN	1.1-1.5
support radio user initiated RUA operations at any time	1.1-1.5
support SwMI (dispatcher) initiated RUA operations at any time	2.1-2.6

shall support RUA accept, RUA reject and RUA cancel PDUs	1.1, 1.3, 2.6, 3.1, 3.2, 4.1, 1.2, 1.5, 2.1, 2.2, 2.4
support configurable destination address for aliasing messages	implementation issue,

## 10.1 Java™, WAP or other programmable section of the UI MANDATORY

The offered radio terminal shall support at least one of the following

- support Java MIDP 2.0.
- support JSR-120 Wireless messaging API for Java applications
- support auto start of Java applications in terminal power on
- support WAP 2.0 and XHTML browser or Wap 1.x browser
- Programmable end user application user interface

## 10.2 PEI interface related requirements MANDATORY

Following test cases from IOP 004-01 Ver. 1.1.3 December 2014 , and all CR changes thereafter related to the following features.

- 2.x (all cases) PEI Link Management
- 3.x (all cases) Individual Calls
- 4.x (all cases) Group Management
- 5.x (all cases) Group Call
- 6.x (all cases) Telephony calls
- 7.x (all cases) Emergency calls
- 8.x (all cases) Short Data
- 9.x (all cases) Status

## 10.3 Features not related to air interface (Optional)

Support of Multiple Control Heads

Audio interface(s) (e.g. 600 ohm)

I/O ports

Status triggered functions

Remote Control messaging

Handset

Touch screen

## 11. Other additional requirements

These requirements are not imposed by the network.

### 11.1 Load directed roaming

The terminal should allow to adjust thresholds (C1, C2) for load based cell re-selection.

### 11.2 In-band signalling support

The offered radio terminal shall enable showing caller's distance and direction on receiving unit's display during individual and group calls as well as emergency calls both in trunked and direct modes.







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# Tämä asiakirja on allekirjoitettu

Lista allekirjoittajista

Allekirjoittaja

Todennus