Liikennevirasto

Guidelines of the Finnish Transport Agency

36/2016

VIRVE Network Requirements for Hand Portable and Mobile Terminals

VIRVE Network Requirements for Hand Portable and Mobile Terminals

Guidelines of the Finnish Transport Agency 36/2016

Finnish Transport Agency
Helsinki 2016

Photo on the cover: State Security Networks Ltd

On-line publication pdf (www.liikennevirasto.fi)
ISSN-L 1798-663X
ISSN 1798-6648
ISBN 978-952-317-337-8

Finnish Transport Agency
P.O.Box 33
FI-00521 HELSINKI
Tel. +358 (0)295 34 3000

Finnish Transport Agency

GUIDELINE

12 December 2016 LIVI/5777/06.04.01/2016

Valid as from
12 December 2016

Replaces
Version dated 22. September 2016
(Guidelines of the Finnish Transport Agency 17/2016)

Key words:
railways, guidelines

VIRVE Network Requirements for hand portable and mobile terminals

Guidelines of the Finnish Transport Agency 36/2016

These guidelines on the acquisition of TETRA mobile terminals are valid as of 12 December 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.

Technical Director Markku Nummelin

Project Manager Tapio Raaska

This guideline is approved by electronic signature.
Marking of the electronic signature is on the last page.

CONTACT INFORMATION
Tapio Raaska
Finnish Transport Agency
tel. +358 (0)29 534 3867

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, December 2016

Finnish Transport Agency
Traffic and Information

Contents

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 with regards to 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
	Registration
perform ITSI-Attach registration at power on	tests 1.1
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.
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, 11.3.1, 11.4.1, 11.4.3	

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	
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 Individual call types: simplex hook and direct calls, duplex hook and emergency call call setup modifications	Individual call 4.1.1, 4.1.2, 4.1.3, 4.1.4 4.2,1, 4.2.2,
support pre-emptive priority call services and pre-emptive speech item	Pre-emptive Priority Call 3.10, 3.11, 4.1.7 (resources pre-emption rel 6) (rel7), 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
support PSTN/PABX call priority modification to emergency priority	PSTN Interconnect / Emergency Telephony calls 6.3.1, 6.3.2

1.2.1 Optional Individual call features

	TETRA IOP Certificate Test Case
support imminent call disconnection (with UI) as specified in TTR001-01	4.1.13 (imminent disconnection with UI)

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	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
support attachment of selected group support attachment of multiple scanned groups support null group attachment (no group selected) support radio terminal initiated group detachments (test 2.3.1) support SwMI initiated group detachment/attachment or any group	2.1.2, 2.1.4, 2.1.5, 2.1.6, 2.1.7, 2.1.8, 3.8.1, (single) 2.2.1, 2.2.2, 2.2.3, 2.2.5, 2.1.7, 2.1.8, (multiple) 2.3.1, 2.3.2, (ms initiated) 2.4.2, 2.4.3, (SwMI initiated)
support different attachment lifetimes	test 1.3.1 /clause 1.
attach any group (GSSI) before using it for reception or transmission It shall not be possible to program the radio terminal not to make the attachment.	Explanation: It shall not be possible to program radio not to make attachment prior to using group for reception or transmission. Requirement means you must never do 'passive attachment',
support scanning on/off indication using U-MM STATUS PDU	MS shall support scanning on off , referring to test case 2.1.7, /clause 2. If MS supports Scanning ON/OFF VIRVE requires MS shall support sending of scanning ON/OFF indication
support different detachment reasons	test cases 2.1.5, 2.1.6, 2,3.1, 2.4.3, 3.13

use CoU Always Scanned value for background groups	test cases 2.1.7 and 2.1.8
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

1.4.1 Optional Group management features

It is necessary that when user changes talk group folder, the scanning list has to change as well to contain groups belonging to the currently selected folder.	

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, 3.2 (late entry) 3.8.1, 3.8.2, 3.8.3 (priority group scanning)
support PTT request queuing	test 3.4, 3.9
support call priority modification (pre-emptive to non-pre-emptive or vice versa)	tested in 3.9

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 Pre-emption of busy users Call setup modifications support emergency call disconnection (by sending U-DISCONNECT) as call owner	6.1.2, 6.2.1 6.1.1 6.1.3, 6.2.2 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
incoming CoU high scanned group call terminates own speech item in lower talk group in case configured to do so	

1.7 Cell re-selection

The offered radio terminal shall

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
Undeclared Unannounced Announced - with Call restoration Announced - without Call restoration support all announced type cell re-selections (1-3) support type 1 handover for duplex calls	7.1.1 7.2.2, 7.2.4, 7.3.1.2 and 7.3.1.2 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

1.7.1 Optional Handover features

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 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 ,

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 support sending group addressed status messages support receiving individually addressed status messages support receiving group addressed status messages	5.1.1 5.2.1, 5.2.2, 5.2.3,

1.8.1 **Optional Status message features**

	TETRA IOP Certificate Test Case IOP001-01 Ver 3.1.0
send Tx Inhibit On/Off message to SwMI Address (FFFFFD)	15.1.1, 15.1.5
be able to receive selective alert status message (FEFD) and to give an audio and visual indication to the user	This requirement is not related to air interface TIP. Receiving certain status value will activate sound and visual alert in terminal.

support sending and receiving Status on FACCH/SACCH	There is no TIP test case for this requirement

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	**Access codes** *The TETRA standard enables the subdivision of random access opportunities by using access codes.* *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.* *This feature requires that the radio terminal supports ACCESS-DEFINE PDU and access code B with priority restriction.* *The use of access code B can be deactivated with a cell-specific parameter.*

support at least two of the Energy Economy modes EG 0 – EG 5	

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

The offered radio terminal shall

	TETRA IOP Certificate Test Case document IOP 001-02 Ver. 2.1.0
shall be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level with regards to this TIP document support sending and receiving individual and group addressed SDS	1.5.1 , 1.5.2
support text message concatenation using UDH protocol as specified in EN300392-2 “138 Message with User Data Header”	1.5.1 Individual addressed multipart SDS transfer (with delivery report) 1.5.2 Group addressed multipart SDS transfer (without delivery report)
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-Latin9 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_latin9 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-Latin9, 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 (i.e. flash messages) automatically without user intervention on the user interface of the offered terminals during ongoing individual and group call and by being automatically visible in addition to TPI.	ETSI TIP test case not available, but Specification TTR 001-02 ver. 2.1.3 December 2013 chapter 6.3.4 Immediate Text Messaging, exists

2.1 Optional Short Data Services features

support receiving Fallback SDS and indicating it	13.4.6

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 with regards to this TIP document	**IOP 001-03 Ver. 2.0.1**
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
Support dispatcher/SwMI initiated (explicit) talk group selection	1.3.1, 1.3.2

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 with regards to this TIP document	**IOP 001-04 Ver. 2.0.0**
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 9: Ambience Listening (non-mandatory)

The offered radio terminal shall

be TETRA Association IOP certified against the Cassidian TETRA infrastructure System Release 6 level with regards to this TIP document	IOP 001-09, Ver. 1.1.0, July 2003
support SwMI initiated ambience listening	1.1, 1.5

6. 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 with regards to this TIP document	**IOP 001-11 Ver. 3.0.2**
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 (Seamed)
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
The offered radio terminal shall remember the cell's CCK over power cycle and then use DCK retrieval during ITSI attach	

7. 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 with regards to this TIP document	**IOP 001-12 Ver 1.0.0**
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, 1.1.8

7.1 Optional

accept individual call whilst engaged in packet data service	

8. 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 with regards to this TIP document	**IOP 001-13 Ver 1.0.0**
support authentication during enable/disable signalling	2.1, 2.2_, 4.1 , 4.2, 9.1 , 9.2,
support enabling/disabling targeted to TEI and ITSI	2, 4. – 5.3
support TEI query	
support roaming while temporarily disabled	"Disabled MS updating"

8.1 Optional Service Interaction features

support mutual authentication during enable/disable signalling	

9. 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 with regards to this TIP document	**IOP 001-14 Ver. 1.0.0**
support Extended Model of TETRA Key Distribution	Operator requirement: electronic transfer only OR physical media, too 1.1, 1.3-1.4

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 with regards to this TIP document	**IOP 001-17 Ver. 1.0.0**
support MS-ISDN and SSI as Radio User Identity types. VIRVE SwMI supports MS-ISDN and ISSI, not so called Alpha Tag.	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- 2.2, 2.6 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

10.1 Optional RUA features

Display RUA number (or numbers), which user has successfully registered in radio unit display when radio unit is IDLE. It is necessary that user is informed what is the status of radio terminals current RUA (aliasing) registration	implementation issue

11. 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 with regards to 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	

11.1 Optional

support sending LIP messages also when temporarily disabled	

12. 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

12.1 PEI interface related requirements MANDATORY

Radio terminal interface has to provide support for 3rd party manufactured control unit (CU). It is mandatory that PEI interface of the radio terminal is in accordance with the specification PEI Part 01: Core AT Commands (PCore) TTR 004-01 Ver. 1.6.0 Nov 2016.

When implemented, radio has to be in accordance with the following test cases from IOP 004-01 Ver. 1.2.0 June 2016, 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.x. (all cases) Packet Data

12.x (all cases) Terminal Management

13.x (all cases) Service Interaction

12.2 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

13. Other additional requirements

These requirements are not imposed by the network.

13.1 Load directed roaming

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

13.2 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.

ISSN-L 1798-663X
ISSN 1798-6648
ISBN 978-952-317-337-8
www.liikennevirasto.fi

Tämä asiakirja on allekirjoitettu

Lista allekirjoittajista

Allekirjoittaja	Todennus
Tapio Raaska 12.12.2016 10:26:28	**Proxy** 12.12.2016 10:25:19
Markku Nummelin 12.12.2016 14:30:35	**Proxy** 12.12.2016 14:30:29