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TETRAPOL FORUM

TETRAPOL Secretariat

Postal address: BP 40 78392 Bois d'Arcy CEDEX - FRANCE
Tel.: +33 1 34 60 55 88 - Fax: +33 1 30 45 28 35

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Foreword

This document is the Publicly Available Specification (PAS) of the TETRAPOL land mobile radio system, which shall provide digital narrow band voice, messaging, and data services. Its main objective is to provide specifications dedicated to the more demanding PMR segment: the public safety. These specifications are also applicable to most PMR networks.

This PAS is a multipart document which consists of:

Part 1	General Network Design
Part 2	Radio Air interface
Part 3	Air Interface Protocol
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1. Scope

This subpart presents the TETRAPOL air interface protocol conformance tests for a mobile station at reference point R3, as defined in PAS 0001-1-1: "TETRAPOL general network design reference model"[1].
This specification covers the minimum characteristics considered necessary in order to provide sufficient equipment performance for a TETRAPOL equipment in a TETRAPOL system and to prevent interference to other services, to other users and to TETRAPOL networks.
This subpart does not replace any of the other recommendations nor is it created to provide full understanding of the TETRAPOL system.
If it is judged that if there is a difference of interpretation between these conformance test specifications and any other TETRAPOL recommendation then the other TETRAPOL Specifications shall prevail.
The system simulator is the equipment that simulates the network, it is a mandatory tool for conformance testing of TETRAPOL mobile station defined in PAS 0001-14: "System Simulator" [2].

2. Normative References

This PAS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this PAS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] PAS 0001-1-1: "TETRAPOL general network design reference model".
[2] PAS 0001-14: "System Simulator".
[3] PAS 0001-3: "Air interface protocol".

3. Abbreviations and definitions

3.1. Abbreviations

For the purposes of this PAS, the following abbreviations apply:

A/I	Air Interface
B-FBM2	BSC Fall Back Mode
BN	Base Network
BS	Base Station
BSC	Base Station Controller
BS2G-MS	Base Station MaSters
BSR2G-SL	Base Station SLave
BSS	Base Station Simulator
BSSim	Base Station Simulator driving a real base station
CCH	Control CHannel
CRP	Connection Reference Point
CRSEL	Cell ReSELection
CSEL	Cell SELection
CUG	Closed User Group
DB	DataBase
DC	Dispatch Centre
DCN	Delivery Confirmation Notification
DCS	Dispatch Centre Server
DFN	Delivery Failure Notification
DM	Direct Mode
DM/NM	Direct Mode / Network Monitoring
DP	Dispatch Position
DPS	Dispatch Position Switch
DPSI	Dispatch Position Switch interface
EDT	External Data Terminal
FBM	FallBack Mode
HRSW	Home RadioSWitch
ISI	Inter System interface
KMC	Key Management Centre
LCIU	Line Connection interface Unit
LCT	Line Connected Terminal
LLC	Logical Link Control
MAC	Medium Access Control
MM	Mobility Management
MMI	Man Machine Interface

MOCH	Multisite Open CHannel
MRI	Mobile Random Identity
MS	Mobile Station
MSG APPLI	Messaging APPLIcation
NM	Normal Mode
NMC	Network Management Centre
NS	Not Significant
NT	Not Tested
NW	NetWork
OG	Operational Group
OMC	Operation and Maintenance Centre
PABX	Private Automatic Branch eXchange
PAS	Publicly Available Specification
(P)DN	(Public) Data Network
PDU	Protocol Data Unit
PMR	Private Mobile Radiocommunications
PSTN	Public Switched Telecommunications Network
PTT	Push-To-Talk
R-FBM1	Radio Switch Fall Back Mode
Ri	Reference point index i
RP	RePeater
RSW	RadioSWitch
RT	Radio Terminal
SADP	Stand Alone Dispatch Position
SCN	Submit Confirm Notification
SDL	Specification and Description Language
SDP	Submit Delivery Protocol
SFN	Submit Failure Notification
SIM	Subscriber Identity Module
SSI	Sub-System Integration test configuration
SS3	UDT Simulator
ST	System Terminal
SwMI	Switching and Management Infrastructure
TCH	Traffic CHannel
TCP/IP	Transmission Control Protocol/Internet Protocol
TDX	Telephone and Data eXchange
TMSG-Id	Temporary MeSsaGe Identifier
TP	TransPort layer
TRX	Base station radio equipment
TTI	Temporary Terminal Identifier
UA	User Agent
UDT	User Data Terminal
VRSW	Visited RadioSWitch
X.400 MTA	X.400 Message Transfer Agent

3.2. Definitions

For the purposes of this PAS, the following definitions apply:
Simulcast: The network radio coverage in one cell (macrocell) is shared by a group of synchronised base stations each covering one part of the cell (microcell). All the BS broadcast the same modulated signal and are seen by terminals as a unique base station in the geographical area covered by the group.
Detachment: the RT estimates a power level below the base station-threshold.
Radio channel loss: the RT detects a frame error rate above than the defined threshold.
Reselection criteria: the RT detects a better power threshold on a neighbouring CCH.

4. Air interface protocol conformance tests

4.1. Introduction

The tests in this specification are performed without any traffic load, testing under traffic load conditions is outside the scope of this specification.
It is the aim that the tests described in this specification shall be possible to perform in an automated manner with a minimum of man machine interface.
The TETRAPOL specifications documents to which conformance is checked are documents referenced PAS 0001-3 "Air interface protocol" [3].
The mobile station may be composed of 3 parts as defined in PAS 0001-1-1 "TETRAPOL general network design reference model" [1] a user data terminal, a SIM, a radio terminal. Only the radio terminal is considered here while the base station is simulated by the system simulator SS1 as defined in PAS 0001-14 "System Simulator" [2].
The configuration is the following:

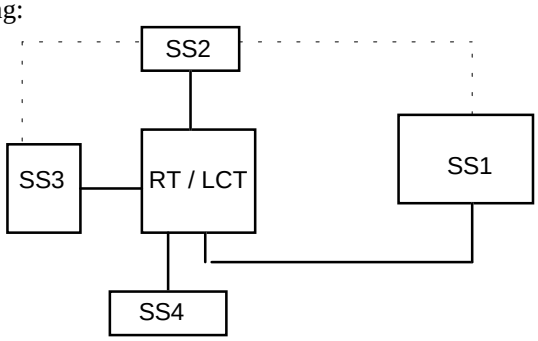

Figure 1: Test configuration - BSSim

This part lists the tests purpose, the tests content and the expected results.
The User Data Terminal may be simulated by SS3 while the MMI may be simulated by SS2. Synchronisation between SS1 and SS2 can be made. This permits automatic data tests (messaging X400, status...) combined with voice frame tests and MMI activation.
Security mechanisms are taken into account in the test and simulate authentication, encryption, key management. SS4 may simulate the SIM.
Tracing of messages exchanged on the air interface is done by the system simulator SS1. SS1 is also called the Base Station Simulator (BSSim)
The physical connection of SS1 to the mobile is done through the antenna connector and to SS3 to the UDT connector.
No assumption is made on the manufacturer implementation of the software and hardware of the mobile. Conformance is checked only with the TETRAPOL specifications.

4.2. General definition of sub-system test

4.2.1. Radio sub-system part

The radio sub-system is built around TETRAPOL network user terminals and the interfaces that provide them with access to the system switching network infrastructure.
The radio sub-system includes:

- Radio terminals (fixed, mobiles, portable) and the various accessories required to connect users to the TETRAPOL network via a base station providing them with direct facilities;
- Line Connected Terminals (LCT) and the various accessories required to connect users to the TETRAPOL network by cable links;
- The PABX gateway (radio terminals, line connected terminals and the PABX interface board) that allows a PABX to be connected to the TETRAPOL network;
- The TETRAPOL network Service Access Dispatch Position (SADP) used to monitor network users and to take part in their conversations;
- Base Stations (BS) that establish a radio link between the switching network infrastructure and radio terminals;

- Independent Digital Repeaters (IDR) that allow different user terminals to communicate on single open channel without a link via the switching network infrastructure;

This part concerns the radio terminal and the line connected terminal.

4.2.2. Major sub-system test objectives

Tests are designed to:

- Verify the conformity of the different sub-systems to the communication protocols used (either with TETRAPOL system, or with external systems: PABX, data terminals). These protocols are described in the PAS documents.
- Guarantee the interoperability of products and all the items associated in the TETRAPOL product line.
- Assess the quality of radio sub-system user services (quality of voice, human engineering, etc.).

To achieve these objectives, the tests are divided into different sets described in the following clauses.

4.2.3. Radio channel tests

TETRAPOL radio channel tests are designed to quality and quantify the quality or transmission of the information exchanged whenever a radio link is involved (RT <-> BS, RT <-> RP, RT <-> RT). The results obtained must comply with expected performance objectives in the case of approval tests.

The performance quality is evaluated in simulated propagation conditions (Rayleigh fading, scrambler), for all possible modulation-demodulation or scanning modes in the system. This evaluation is undertaken when an TETRAPOL product is presented to a certifying body, for example. The purpose is not to qualify equipment, and tests are carried out in ambient temperature conditions, with nominal power supplies and without introducing simulated disturbances.

4.3. Automatic protocol tests

4.3.1. Automatic tests objective

The automatic tests executed by BSSim and SS simulators are designed to run a set of scenarii that check correct nominal operations of a terminal (open channel, individual calls, direct calls,...). Neither endurance, MMI or exceptional cases are tested.

An ASCII trace file lists all the tests that are executed with individual test reports.

A test session involves 2, 3 or 4 terminals.

4.3.2. BSSim and SS2 features

BSSim is a network simulator that supports tests tasks emulating network behaviour. BSSim is written in C language. One test task may simulate BCH management, for example, whereas another simulates individual calls. SS2 simulates a Man Machine Interface (MMI) and SS3 simulates a User Data Terminal (UDT). It is a UNIX PC to which SS2 lines are connected in place of the MMI. To perform data tests, serial lines can be connected on the RT.

5. Automatic tests description

An ASCII configuration file defines the tests that are executed during the test session, the number of RT involved, the base station number, the number of test session iterations and the tested project. It is then interpreted by a shell-script to create the variables for use in test scenarii.

The file contains a list of key words to which values are assigned: YES, NO or numeric values. The file is read at the beginning of the master BSSim scenario and interpreted by a shell-script to create the variables for use in test scenarii

The following test steps are recommended.

5.1. Registration

Each test session begins with a registration test and terminal identification (RFSI, hard and software versions). Depending on the defined options, a terminal may or may not be forced to register with a network other than the regional network.

Main tested capabilities:

- On/Off;
- Technical network management/Forcing;
- Technical network management/Identity.

This test is blocking, if any errors occur, BSSim and SS2 scenarii are aborted.

5.2. Key delivery

This is a special test sequence that does not require SS2 involvement (no MMI event). BSSim distributes TTK and RNK keys to previously registered and identified terminals.

5.3. Individual voice calls

This test involves two terminals. One of them waits for an incoming call and sends certain number of speech frames when the call is set up.

The other makes an outgoing call, sends a few speech frames when the call is set up then releases the call when the other user talks or not.

Main tested capabilities:

- Dialling, sending;
- Off-hook;
- Push to talk, speech;
- End of call;
- SCHTI.

5.4. Multi-party voice calls

One terminal is used for this test. Its purpose is to check that an appropriate TSDU is transmitted. The terminal is asked to call 2 numbers. BSSim (network) obviously refuses the calls. If the terminal interprets the refusal correctly, the test is repeated with 3 number, then with 4.

Major tested capabilities:

- Multi party dialling;
- Call refusal.

5.5. Inter-group calls

Special-purpose network test.

5.6. CCH open channel call

Two terminals are required for this test to check that one of them can take an incoming call while waiting on a CCH open channel.

RT1 selects and goes to an open channel, but does not activate it. RT2 calls RT1. The two terminals converse in private mode, then go on hook RT2 closes the open channel.

Major tested capabilities:

- Open channel menu;
- Individual call.

5.7. Call transfer

Call transfer tests involve three RTs. RT3 waits for an incoming call, RT2 as well but has to transfer the call to RT during the conversation with RT2.

Major tested capabilities

- Call transfer;
- Individual call.

5.8. Temporary open channel

This test involves two radio terminals. One of the RT selects and goes to an open channel, the other RT waits for the open channel notification and goes to it.

The two RTs normally exchange speech frames, but if it is activated the BSSim subsequently prevents asynchronous transmission. The two RTs remain on the open channel for a short while, then the RT that opened the channel closes it and the other goes on hook:

Main tested capabilities

- Open channel menu;
- CCH channel activity;
- Asynchronous transmission analysis;
- CUG;
- Encrypted or nonencrypted communication.

5.9. Direct call

This tests involves two RTs. Each RT selects a direct channel, it transmits and receives a few speech frames, then goes on hook.

No BSSim test tasks are involved. Registration done before.

Main tested capability:

- Direct mode.

5.10. Inter-personal messaging

This test involves two RTs. RT1 waits for a messages (with a time-out). RT2 sends a message to RT2 and waits for an submit confirm notification (SCN) or submit failure notification (SFN).

It should be remembered that BSSim serves as a user data terminal for both RTs at once. The message is automatically formatted by a shell-script from a template files with the tested project name and RFSI of the recipient RT.

Main tested capability:

- Sending and receiving data (encrypted or not).

5.11. Emergency open channel

This test involves two RTs. RT1 waits for the emergency channel to open. RT2 opens an emergency channel, converses with RT2 then closes the emergency channel.

The test does not check whether RT2 changes to direct mode if the emergency open channel open request is unsuccessful.

Main tested capability:

- Emergency open channel.

5.12. Enabling/Disabling traffic

This test involves two RTs. The BSSim activity management task asks for RT1 traffic disabling. BSSim then makes an individual voice call from RT1 to RT2. RT1 should return an error code to indicate that traffic is disabled. If all goes well, RT1 is enabled and another call is sent to RT2, that should be successful.
Main tested capability:

- Effective traffic disabling/enabling (On/Off).

5.13. Start/Stop forwarding

RT1 is forwarded to RT2. To check that RT1 forwarding is effective, activity signalling is started to obtain RT1 status. To do this, the TLR timer is modified and waits for a message from the BSSim activity management task indicating that RT1 has sent back its status.
To complete the test, forwarding is stopped and RT1 returns to its initial status.
Main tested capability:

- Technical network management/Forwarding;
- Power on and registration of forwarded RT;
- RT activity signalling.

5.14. Activity messages

This test checks that the RT sends an activity messages when the value of the time since last registration reaches T730. The system time is modified and waits for a message form the BSSim activity management task.
It should be noted that when all the tests are selected, this tests follows the previous test that checked the activity signalling function.
Main tested capability

- RT activity signalling.

5.15. Service barring/unbarring

RT1 service is barred and RT1 is asked to call RT2. The call is not successful and the terminal returns a message to SS2 indicating barred service.
The BSSim scenario then asks SS2 to deactivate/reactivate the terminal. The terminal should try to reregister. When the terminal is registered, and RT1 attempts to call RT2 again.

5.16. Spontaneous reregistration

This test is similar to the RT activity test, but the time since last registration is modified to a value exceeding T731. The terminal should start a registration procedure. The scenario modifies the TLR timer and waits for a message form the BSSim registration task indicating that the terminal is registered.
Main tested capability:

- Spontaneous reregistration.

6. Typical test session sequence

At the start of the session, a master BSSim and master SS2 scenario are executed on a BSSim/SS2 couple interconnected by an Ethernet link. The master BSSim scenario directs the test session and reads the contents of the config.scr file defined by the tester. The master SS2 scenario always waits for commands from the BSSim scenario (conveyed by TCP/IP primitives).
The BSSim scenario sends a command to SS2 (for example, SPEECH RT1, RT2) then executes the appropriate test tasks (for voice call tests, the speech task is executed, ...).
SS2 scenario executes the child scenarii, each of which handles one terminal. The child scenarii start up the RT then wait for more detailed instructions from BSSim. For a voice call test, for example, a child scenario receives a INCOMING_CALL_WAITING instruction, whereas the other receives an OUTGOING_CALL instruction.
When the test step has been completed, the SS2 child scenarii return reports to the BSSim scenario.

6.1. Result file

On the BSSim side, an ASCII file (trace.def in the trace directory) contains plain language trace information on all the test steps. The messages exchanged by BSSim and SS2 are recorded with the result of each test (OK, NOK).
When the master SS2 scenario starts to execute, a request is made to log all the test steps in a file. This file can be read on SS2 when the tests are completed.

7. Test suites

7.1. Terminal environment tests

These tests guarantee terminal operability in different TETRAPOL system configurations (car, motorbike, fixed, portable, remotely connected, etc.).
They test the software packages that manage the various accessories and interfaces that may be connected by a customer, and included in TETRAPOL. These tests check the behaviour of TETRAPOL terminals faced with outside events other than those encountered in hardware qualification tests: stand alone terminal autonomy...

7.2. Base station tests

These tests are designed to check the functional behaviour of base stations and independent digital repeaters in the TETRAPOL network. Signal quantification tests are performed during radio channel tests.
The internal interface specifications of BS are tested against the rest of the network infrastructure. The behaviour of the functional BS software and hardware releases is verified (configuration, status changes, hardware surveillance).

7.3. Dispatch position tests

These tests concern the conformance tests of the dispatch position in a TETRAPOL system.
They involve both the SADP network terminal interface and the X.25 network interface.
They are performed with system and X.25 link simulators.
The tests are performed step-by-step (X.25 scenarii), by the system simulator that executes test tasks containing specific MMI commands to emulate radio terminal links. Calls are set up with a line connected terminal on the same TETRAPOL functional level, or via a PABX gateway.
The extremely high number of SADP access possibilities, the complexity of the real network configuration to which the SADP is connected, the specifics of the SADP) means that tests are not wholly comprehensive. The limitations of these tests are indicated whenever possible, as opposed to terminal and base station tests that are wholly representative of their behaviour in the field.

7.4. PABX gateway tests

These tests are designed to check PABX gateway operability by establishing communications between terminals connected to a host PABX and TETRAPOL system terminals, and to evaluate the performance of voice activity detectors that allow telephone set users to take part in a semi-duplex TETRAPOL system call (immunity to noise, crossed transmission-reception).

7.5. Simulcast tests

These tests are designed to check TETRAPOL network behaviour in a simulcast configuration (configuration, initialisation), and to measure the limits of radio channel operations in this specific network definition.

7.6. Cell reselection tests

These tests are designed to qualify and quantify the behaviour of roaming terminals where cells need to be reselected (real cell reselection thresholds, effectiveness of algorithms, affects on application behaviour, etc.). Characteristics can be pre-assessed during radio channel tests by validating the scanning mechanisms used by the terminals to measure the power levels received from neighbouring cells).

8. Terminal conformance tests.

8.1. RT test configuration

The test configuration includes a [4]-channel base station simulator, [three] radio terminals, a mobile set and [two] line connected terminals.
For most tests, the base station simulator is configured to provide one CCH and three TCHs. For tests requiring two base stations (inter base networks or umbrella open channel) the BSSim has two independent CCH/TCH pairs. Variable attenuators located on PA outlets regulate received signal levels on each simulated base station. Base Station Simulator tasks allow network parameters to be varied.
The following tables describe the initial state of each test, the actions and the final state for the MS and LCT for each family of tests.
OK means applicable.

8.2. Registration tests

Table 1: Registration tests

Initial status	Actions	Final status	MS	LCT
RT in cell selection. The base station is initialised.	Start of BSS Broadcasting	After exchanging RACH/RCG and when T203 expires, RT returns to CSEL.	OK	OK
RT in cell selection. No preferred base station is requested.	Start of BSS Broadcasting and Registration	The terminal registers.	OK	OK
RT in cell selection. A preferred base station is requested.	Initialise the two base stations, one is the preferred base station. BSS tests start to execute.	The terminal registers with its preferred base station.	OK	NS
RT in cell selection. A preferred base station is requested.	Initialise the two base stations, one is the selected preferred BS, sufficiently attenuated to be out of RT sight.	The terminal registers with its «second choice» BS.	OK	NS

8.3. Individual and multi-party voice call tests

Table 2: Individual and multi-party voice call tests

Initial status	Actions	Final status	MS	LCT
RT1 and RT2 registered with the same base station	RT1 calls RT2.	RT1 and RT2 interconnected on TCH	OK	OK
RT1 and RT2 registered with the same base station	RT1 calls RT2 with FLASH priority.	RT1 and RT2 FLASH call connected on TCH	OK	OK
RT1 registered	RT1 calls RT2, RT3, RT. NW refuses the transaction.	RT1 indicates Service Disabled	OK	OK
RT1 registered. RT2 not registered	RT1 calls RT2. NW refuses the transaction.	RT1 indicates Unsuccessful Remote RAD	OK	OK
RT1 registered. RT2 registered with another base station	RT1 calls RT2. NW refuses the transaction.	RT1 indicates Unsuccessful Remote RAD	OK	OK
RT1 and RT2 interconnected. RT3 registered.	RT3 calls RT1. NW refuses the transaction.	RT3 indicates BUSY	OK	NT
RT1 and RT2 interconnected.	RT3 calls RT1 with FLASH priority.	RT2 is preempted by the network. RT1 and RT3 are interconnected	OK	NT
RT1 and RT2 interconnected. RT2 is talking.	RT3 calls RT1 with FLASH priority.	RT2 is preempted by the network. RT1 and RT3 are interconnected	OK	NT
RT1 and RT2 interconnected.	RT1 transfers RT2 to RT3.	RT1 is released. RT2 and RT3 are interconnected.	OK	NT

8.4. Open channel tests

8.4.1. Open channels

Table 3: Open channels

Initial status	Actions	Final status	MS	LCT
RT is registered.	Open a channel with an MMI command on the Base Station simulator	The open channel is added to the list	OK	OK
RT is registered, a channel is open.	RT selects the open channel.	RT selects the open channel and remains on CCH.	OK	OK
RT is on open CCH channel.	Activate the open channel (BSS MMI). BSS transmits.	RT goes to TCH, does not send - ACTIVE_CALL and sends speech frames.	OK	OK
RT is on open CCH channel.	The open channel is not active. The Base Station simulator transmits. RT sends ACTIVE_CALL.	When NW sends ongoing call , RT1 goes to TCH and sends speech frames.	OK	OK
RT is on open CCH channel.	The open channel is lost (BSS MMI)	RT makes CONF. X flash	OK	OK
RT is on open CCH channel.	RT2 calls RT1.	RT1 switches to an individual call.	OK	OK
RT1 is on open CCH channel.	RT2 calls RT1. RT1 interconnected as individual call. RT2 releases the call.	RT1 switches back to the open channel.	OK	OK
RT1 is on open CCH channel with FLASH priority	RT2 calls RT1.	The call is not successful.	OK	OK
RT is on open channel	RT releases the open channel.	The open channel is effectively closed. RT goes back to waiting.	OK	OK
RT is registered.	Open a broadcast call channel (priority 8) with an MMI command on BSS.	RT rings and selects the open channel. No MMI is possible except for emergency calls.	OK	OK
RT is registered.	Open a channel with the RT's nominal OG.	The open channel is added to the list of open channels.	OK	OK
RT is registered and assigned an OG.	Open a channel with that OG.	The open channel is added to the list of open channels.	OK	OK
RT is registered and assigned an OG.	Open a channel with all groups.	The open channel is added to the list of open channels.	OK	OK
RT is registered and assigned an OG.	Open a channel with another OG.	The open channel is added to the list of open channels.	OK	OK
RT is registered and assigned OG1. A composite OG containing OG1 is broadcast.	Open a channel with a composite OG.	The open channel is added to the list of open channels.	OK	OK
RT is registered and keys are delivered.	RT selects an encrypted open channel.	The open channel is correctly established.	OK	OK

RT is registered and keys are delivered.	RT selects and goes to the encrypted open channel.	RT goes to the open channel correctly The pictograph representing the key does not flash.	OK	OK
RT is registered and a channel is open.	RT participates on the open channel.	RT goes to the open channel and communicates with the other RTs correctly.	NS	OK

8.4.2. Umbrella open channels

Table 4: Umbrella open channels

Initial status	Actions	Final status	MS	LCT
RT1 is registered with BS1, RT2 is registered with BS2.	Open an umbrella channel with an MMI command on BSS.	The open channel is added to the lists on RT1 and RT2.	OK	OK
RT is registered with BS1. A district channel is open on BS1.	Open an umbrella channel with an MMI command on BSS.	The district and umbrella open channels are added to the list on RT.	OK	OK
RT1 is registered with BS1, RT2 registered with BS2.	Open an umbrella and inter-district channel with an MMI command on BSS.	The open channels are added to the list on RT1 and RT2.	OK	OK
RT is registered and assigned an OG.	Open an umbrella channel with that OG.	The open channel is added to the list.	OK	OK
RT is registered and assigned an OG.	Open an umbrella channel with all groups.	The open channel is added to the list.	OK	OK
RT is registered and assigned an OG.	Open an umbrella channel with another OG.	The open channel is added to the list.	OK	OK
RT is registered and assigned OG1 . A composite OG containing OG1 is broadcast.	Open an umbrella channel with the composite OG.	The open channel is added to the list.	OK	OK

8.5. Emergency open channel tests

Table 5: Emergency open channel tests

Initial status	Actions	Final status	MS	LCT
RT is registered.	Open an emergency open channel with an MMI command on BSS.	RT rings and displays SOS channel.	OK	OK
RT is registered.	Open an emergency channel with an MMI command on BSS. RT rings, press send.	RT stops ringing and goes to the emergency open channel.	OK	OK
RT is not registered. An emergency channel is open	Switch on RT after broadcasting an EMERGENCY message, the RT registers .	The emergency open channel is added to the list on RT.	OK	OK
RT is registered.	Press the emergency button.	The open channel is connected to BS. RT goes to the emergency open channel.	OK	NS
RT is on temporary open channel.	Open an emergency open channel (with an MMI command or with another RT).	RT rings and displays SOS channel.	OK	OK
RT is engaged in an individual call.	Open an emergency open channel (with an MMI command or with another RT).	RT rings and displays SOS channel.	OK	OK
RT is on the emergency open channel	Press the emergency button.	An open emergency channel request is sent to NW.	OK	NS
RT is registered. The Emergency tester is stopped	Press the emergency button.	RT tries to select the emergency open channel then selects direct mode emergency call.	OK	NS
RT is not registered. The Emergency tester is stopped	Press the emergency button.	RT selects direct mode emergency call.	OK	NS
RT1 is on temporary open channel. RT2 is not registered.	Press the emergency button on RT2.	RT1 rings and displays SOS DIR.	OK	NS
RT1 is engaged in an individual call. RT2 is not registered.	Press the emergency button on RT2	RT1 rings and displays SOS DIR.	OK	NS
RT is registered and an emergency channel is open.	RT participates on the emergency open channel.	RT goes to the emergency open channel and communicates with the other RT correctly.	NS	OK

8.6. Messaging tests

SS3 simulates the UDT in messaging tests. A message sending scenario and a message reception scenario are running on SS3.
Moreover, the task simulating the data application on BSSim relays the messages issued by one terminal towards the recipient, and sends service messages. BSS task parameters can be set to send SCN, SFN and DFN messages.
All the messages that SS3 received are saved in files and can be used to test the reliability of transmission.
The size of service messages may vary and require one of more TPDU.

Table 6: Messaging tests

Initial status	Actions	Final status	MS	LCT
RT is not registered.	Connect the UDT. RT tries to connect to UDT.	The connection is established between the RT and UDT.	OK	NT
RT is registered.	Connect the UDT. RT tries to connect to UDT.	The connection is established between RT and UDT.	OK	NT
RT1 and RT2 registered. UDT1 is waiting for a message.	UDT2 sends a message addressed to UDT1.	The message is sent to BSS and relayed to UDT1. UDT2 receives an SCN.	OK	NT
RT1 is registered and connected to UDT1. RT2 is not registered.	UDT1 sends a message addressed to UDT2.	The message is sent to BSS. UDT1 receives an SFN.	OK	NT
RT1 is registered and connected to UDT1. RT2 is registered. BSS is set to send a DFN.	UDT1 sends a message addressed to UDT2.	The message is sent to BSS. UDT1 receives an SCN then a DFN.	OK	NT
RT is registered and connected to UDT.	BSS sends a service message.	UDT receives the message.	OK	NT

8.7. Fall back mode

Table 7: Fall back mode

Initial status	Actions	Final status	MS	LCT
RT is registered.	BS changes to R-FBM1	RT displays LOCAL CHANNEL	OK	OK
RT is registered. Several open channels are open on BS.	BS changes to R-FBM1	RT selects the R-FBM1 open channel with the lowest number.	NOK	NS
RT is registered.	BS changes to B-FBM2	RT displays OPEN CHANNEL	OK	NS
RT is registered with BS1.	BS1 changes to R-FBM1. BS2 remains NM.	RT displays LOCAL CHANNEL	OK	OK
RT is registered with BS1.	BS1 changes to B-FBM2. BS2 remains NM.	RT goes to CELL RESELECTION and registers with BS2	OK	NS
RT switched off	BS1 in NM, BS2 in R-FBM1. Switch on RT, and enter BS2 as preferred BS2.	RT changes to LOCAL CHANNEL on BS2	OK	NS
RT is on open CCH channel	BS changes to R-FBM1 then returns to NM.	CONF. X flashes then RT returns to the open channel.	OK	OK
RT is on open CCH channel	BS changes to B-FBM2 then returns to NM.	CONF. X flashes then RT returns to the open channel.	OK	NS
RT is on emergency open CCH channel	BS changes to R-FBM1 then returns to NM.	SOS CONF. X flashes then RT returns to the open channel.	OK	OK
RT is on open CCH channel	BS changes to B-FBM2 then returns to NM.	SOS CONF. X flashes then RT returns to the open channel.	OK	NS
RT is on emergency open channel R-FBM1	Press the emergency key.	RT changes to direct mode emergency call.	OK	NS
RT is on local open channel B-FBM2	Press the emergency key.	RT changes to direct mode emergency call	OK	NS

8.8. Cell selection

A BSS, configured to act as two separate bases stations are used for cell selection tests. Cell-Selection messages are broadcast on both CCH each name the other base station as the neighbouring call in the same network (different R1R2R3).

Table 8: Cell selection

Initial status	Actions	Final status	MS	LCT
RT off. BS1 and BS2 are initialised. BS1 attenuated by 60 dB.	Switch on RT.	RT is registered with BS2.	OK	NS
RT off. BS1 and BS2 are initialised. BS1 is attenuated by 20 dB in relation to BS2.	Switch on RT and specify BS1 as preferred network.	RT is registered with BS1.	OK	NS
RT off. BS1 and BS2 are initialised. BS1 is greatly attenuated.	Switch on RT and specify BS1 as preferred network.	RT is registered with BS2.	OK	NS
BS1 and BS2 are initialised. RT is registered with BS1.	Strongly attenuate BS1	RT goes into CSEL and is registered with BS2.	OK	NS
RT in CSEL	Press the emergency button	RT goes into direct mode emergency call	OK	NS
Open a Broadcast call channel on BS. RT selects the open channel: C.	Strongly attenuate BS. When RT starts CSEL, close the open channel C and set it up again with routine priority. Stop BS attenuation.	RT returns to BS and detects open channel C with routine priority.	OK	NS
RT is registered with BS1. A broadcast call channel is open on BS1 and BS2.	Strongly attenuate BS1.	RT goes into CSEL and reregisters with BS2 and selects the broadcast call channel	OK	NS
RT is registered with BS1. A Broadcast call channel is open on BS1 and an emergency channel on BS2.	Strongly attenuate BS1.	RT goes into CSEL and reregisters with BS2. The emergency open channel is added to the list of open channels.	OK	NS
RT is registered with BS1. An emergency channel is open on BS1 and a broadcast call channel on BS2.	Strongly attenuate BS1.	RT goes into CSEL and reregisters with BS2 and selects the broadcast call channel	OK	NS
RT is engaged in an individual call.	Strongly attenuate CCH and TCH on BS1.	RT ends the individual call and reregisters with BS2	OK	NS
RT is registered with BS1. BS2 is in R-FBM1.	Strongly attenuate BS1.	RT goes into CSEL and selects local open channel on BS2.	OK	NS
A channel is open on BS1. RT selects the open channel.	Strongly attenuate BS1.	RT goes into CSEL and reregisters with BS2. It does not detect the open channel (CONF. X flashes)	OK	NS
Channel1 open on BS1 and open channel2 on BS2. RT is registered with BS1.	Strongly attenuate BS1.	RT goes into CSEL and reregisters with BS2. Open channel1 is withdrawn from the list and open channel2 is added.	OK	NS
An inter-district channel is open on BS1 and BS2. RT is on the BS1 open channel.	Strongly attenuate BS1.	RT goes into CSEL and reregisters with BS2 and selects the open channel.	OK	NS

Umbrella channel open on BS1 and BS2. RT is on the BS1 open channel.	Strongly attenuate BS1.	RT goes into CSEL and reregisters with BS2 and selects the open channel.	OK	NS

8.9. Cell reselection

The Cell reselection configuration is used for these tests, but with identical RFSI for the two cells.

Table 9: Cell reselection

Initial status	Actions	Final status	MS	LCT
BS1 and BS2 are initialised. RT is registered with BS1.	Attenuate BS1 by 20 dB in relation to BS2.	RT goes into cell reselection and registers with BS2.	OK	NS
RT is registered with BS1. A Broadcast call is open on BS1 and BS2.	Attenuate BS1.	RT registers with BS2 and selects the broadcast call channel.	NS	NS
RT is registered with BS1. A Broadcast call is open on BS1 and an emergency channel on BS2.	Attenuate BS1.	RT registers with BS2 and the emergency channel is added to the list of open channels	OK	NS
RT is registered with BS1. A Broadcast call is open on BS1 and an emergency channel on BS2.	Attenuate BS1.	RT reregisters with BS2 and the emergency channel is added to the list of open channels	OK	NS
RT is registered with BS1. An emergency channel is open on BS1 and a broadcast call on BS2.	Attenuate BS1.	RT reregisters with BS2 and selects the broadcast call channel	NS	NS
RT is engaged in an individual call	Attenuate CCH (strongly) and TCH of BS1.	RT ends the individual call and reregisters with BS2	OK	NS
RT1 and RT2 are registered with BS1. RT1 calls RT2.	During routing, attenuate BS1.	The individual call is aborted; RT1 and RT2 reregister with BS2	OK	NS
RT is registered with BS1. BS2 is in R-FBM1.	Attenuate BS1.	RT changes to cell reselection and selects the local channel on BS2.	NOK	NS
Open channel on BS1. RT is on the open channel.	Attenuate BS1.	RT reregisters with BS2 but does not detect the open channel. (CONF. X flashes)	OK	NS
Open channel 1 on BS1 and open channel 2 on BS2. RT is registered with BS1.	Attenuate BS1.	RT registers with BS2. Open channel 1 is withdrawn from the list and open channel2 is added.	OK	NS
Open channel 1 on BS1. RT is registered with BS1 and is on the open channel 1	Attenuate BS1.	RT reregisters with BS2. Open channel 1 flashes.	OK	NS

Emergency open channel on BS1. RT is registered with BS1 and is on the emergency open channel.	Attenuate BS1.	RT registers with BS2. SOS CONF flashes.	OK	NS
An inter BN open channel on BS1 and BS2. RT is on the BS1 open channel.	Attenuate BS1.	RT reregisters with BS2 and goes to the open channel.	OK	NS
An umbrella open channel on BS1 and BS2. RT is on the BS1 open channel.	Attenuate BS1.	RT reregisters with BS2 and selects the open channel.	OK	NS
BS1 and BS2 are initialised with different R1R2R3. RT is registered with BS1 , its preferred network.	Attenuate BS1.	RT remains under BS1.	OK	NS
BS1 and BS2 are initialised with different R1R2R3. RT is registered with BS1, that is not its preferred network. BS2 is its preferred network.	Attenuate BS1.	RT registers with BS2.	OK	NS

8.10. Miscellaneous tests

8.10.1. Direct mode

Table 10: Direct mode

Initial status	Actions	Final status	MS	LCT
RT1 and RT2 are not registered.	Select direct mode.	The terminals are interconnected	OK	NS
RT1 and RT2 are registered.	Select direct mode.	The terminals are interconnected	OK	NS
RT1 and RT2 are not registered.	Select direct mode. Request encrypting on RT1.	Speech is audible but incomprehensible	OK	NS
RT1 is in direct mode.	RT2 makes a direct mode emergency call	RT changes to direct mode emergency call and displays SOS DIR	OK	NS

8.10.2. Activity signalling

Table 11: Activity signalling

Initial status	Actions	Final status	MS	LCT
RT is registered.	Switch off RT. Change system time to T0+T730. Switch on RT.	RT sends an ACTIVE TSDU to indicate its presence.	OK	OK
RT is registered.	Switch off RT. Change system time to T0+T731. Switch on RT.	RT reregisters.	OK	OK
RT is registered.	Switch off RT Change system time to T0+T730. Switch on RT. RT signals its activity and NW replies with a REFUSED TSDU.	RT reregisters.	OK	OK

8.10.3. Forwarding

Table 12: Forwarding

Initial status	Actions	Final status	MS	LCT
RT is registered.	RT requests forwarding to a registered RT.	RT displays FORWARDED	OK	OK
RT is registered.	RT requests forwarding to an unregistered RT.	RT displays ERROR NUMBER	OK	OK
RT is registered and forwarded.	Change system time to T0+T730.	RT reports its presence with an ACTIVE TSDU specifying forwarded status.	OK	OK
RT is forwarded.	Cancel forwarding and change system time to T730.	RT reports its presence with an ACTIVE TSDU specifying unforwarded status	OK	OK

8.10.4. OG and key delivery

Table 13: OG and key delivery

Initial status	Actions	Final status	MS	LCT
RT is registered.	NW distributes local and secondary OG then opens a channel with one of the OGs.	RT detects the open channel in the list.	OK	OK
RT is registered. Assigned Ogs have been delivered.	NW delivers a list of empty OGs. A channel is opened with one of the old OGs.	The open channel is not included in the list.	OK	OK
RT1 and RT2 are registered	Deliver TTK and RNK keys. Request individual call ciphering (SPEECH on BSS). RT1 calls RT2.	The call is set up between RT1 and RT2.	OK	OK

8.10.5. Access/traffic/service disabling/enabling

Table 14: Access/traffic/service disabling/enabling

Initial status	Actions	Final status	MS	LCT
RT is registered.	NW disables RT access.	RT resets. RT must return to factory test mode.	OK	OK
RT is registered.	NW disables RT service.	RT can not register.	OK	OK
RT is registered.	NW disables RT traffic.	RT remains registered but set up make relayed calls. TRAFFIC DISABLED is displayed. RT detects the open channel list, but cannot enter.	OK	OK
RT is registered.	NW enables RT traffic.	RT can set up relayed calls again.	OK	OK

8.10.6. DM/NM

Table 15: DM/NM

Initial status	Actions	Final status	MS	LCT
RT is in direct mode .	Request network monitoring.	RT registers.	OK	NS
RT is in direct mode .	Request network monitoring. The network is in R-FBM1	RT registers.	OK	NS
RT is in DM/NM.	Activate direct mode from the RT then change back to sleeping.	RT changes to direct mode then DM/NM.	OK	NS
RT1 is in DM/NM.	RT2 calls RT1.	RT1 rings and can set up an individual call.	OK	NS
RT is in DM/NM.	Open an emergency channel	RT receives the emergency call report	OK	NS
RT is in DM/NM.	Open a broadcast call channel	RT selects the broadcast call channel	OK	NS
RT is in DM/NM.	Direct mode emergency call arrival	RT receives the emergency call.	OK	NS
RT is in DM/NM on BS1. BS2 belongs to the same base network.	Attenuate BS1.	RT changes to cell reselection and reregisters with BS2.	OK	NS

9. Simulcast tests

9.1. Introduction

This subclause defines the simulcast tests carried. It lists the different test objectives and indicates the expected results.

10. Overall test objectives

The overall purpose of these tests is to check the behaviour of base stations in master-slave configurations and to qualify and measure the behaviour of terminals in a simulcast TETRAPOL network as opposed to a conventional TETRAPOL cellular network.

The tests require:

- Checking of base station BS functionalities;
- Qualification of slave station synchronisation on the master;
- Checking of terminal behavior in simulated propagation and interference conditions.

11. Base station tests

11.1. Objectives

These tests are designed to check the functions of BS in a simulcast configuration of master and slave base stations: BS initialisation, training to support PCM link offset within the range of values specified for the system, the ability to transmit PHA related information by slave stations, integration of TNLO rate adapters on PCM links. They are also designed to validate the variation of corrective values applied to PHA that are subsequently used for synchronisation tests.

11.2. Specific tests requirements

11.2.1. Hardware configuration

1 network master base station.
1 network slave base station.
1 mini RSW.
1 standard digital link.
1 optic fiber link connecting the two BS.

11.2.2. Completion criteria

The BS shall start correctly, the TX/RX shall initialise and the link with PHA shall be opened (static configuration).
The clock selection is correct.
The slave station generates a control value for all master-slave connection configurations specified, including interfaces limit conditions (phase jitter, skips and slips,..). A PHA control curve matching a monotonous function has been traced and will serve as reference for the patches applied in simulation tests.
The value generated for each offset in within the expected range and corresponds to the equation included in BS code.
A SIMAPP function is used to vary the PHA control value.

11.3. Test methods

In these tests, the master base station is connected to slave base stations via the sort of device as normally will be used in the network, introducing any necessary «disturbances » to simulate transmission in outer tolerance limit conditions.
MSW <-PCM link-> BS2G-MS <-PCM link-> BS2G-SL
The PCM link is either a standard digital link, or an optic fiber link containing TNLO converters. A daughter MIC1 board generates a given delay through shift registers (the same simulated delay in both link directions).
The control values applied to the slave PHA are applied, and the variations resulting from line disturbances are measured.
A test is performed to check that the patch function executes the control values effectively applied in real conditions when the link between base stations is returned to its normal platform configuration.

11.4. Resources

11.4.1. Hardware resources

Multi-pair optic fiber cable varying up to [5] km
Daughter MIC1 board to simulate delay. (NMC HW)
TLNO electrical<->optic converter
TE820 line analyser
PCM disturbance simulator
PCM interface interview
Console.
Serial link analyzers (control measurements).
Logic analyser or memory driven oscilloscope
PC for TRX commands

12. Slave or master base station synchronisation tests

12.1. Objectives

These tests are designed to validate the effective control of the master base station on the pilot and slave base station clocks and to measure the effective stability. They also test PHA alarm feedback to BS if timing control is lost.

The behaviour of the slave PHA is also tested when BS is not in line of sight.

12.2. Specific test requirements

12.2.1. Hardware configuration

1 master network base station

2 slave network base stations

1 MSW

12.2.2. Completion criteria

Clocks and pilot control effectively synchronise regardless of the timing control values applied by BS on the slave base station PHA module though the defined range of values, depending on the delays injected on PCM links.

Synchronisation remains stable with time and is not affected by internal base station activities (carrier selection, shutdown of modules,....) or external events (EMC).

Oscillations around the synchro remain negligible.

The passage of PCM signals through the first base stations do not affect the synchronisation of the second base along the line, and do not generate errors in corrective values calculated by BSs, regardless of the connection device that are used.

A change in the PHA timing control value results in immediate resetting and does not cause PHA slave clock phase over-oscillation.

If PHA does not detect BS presence, the module starts up in alarm mode and generates no clock whatsoever. The slave BS does not start up.

12.3. Test methods

A digital oscilloscope is used to compare the measurements from the different base station clocks retrieved on front panel PHA module test connectors.

The compensated delays simulated by BS patches are used to verify the corresponding clock offset and to qualify slave BS clock transitions when the timing control value changes.

The PC MMI connected on the MMI bus is used to active the radio channel carriers in slave stations and evaluate disturbances caused by timing control signals. Disturbances are also simulated and evaluated by switching off/on non vital control modules.

EMC DES disturbances (input/output device, power supply problems) are applied to evaluate the device’s resistance to external events.

The phase is purposely unlocked in PHA modules to test that the condition is detected and to validate alarm feedback to BS.

12.4. Resources

12.4.1. Hardware resources

PC for TRX commands

Console for value patches

Memory driven oscilloscope

13. Simulated condition tests

13.1. Objectives

These tests are designed to measure the degradation (if any) of terminal signal processing performances (error rate, failures, ...) in simulated simulcast operating conditions when the radio subsystem is subjected to disturbances (interference, scrambling,...).

Multiple path simulator is used to generate two faded paths from the same network base station.

13.2. Specific tests requirements

13.2.1. Hardware configuration

1 network base station

1 system portable

13.2.2. Completion criteria

The sensitivity of terminals subjected to Rayleigh fading is kept in the presence of intersymbol interferences equal or less than [30] µs, for a roaming speed of up to [150] km/h.

13.3. Test methods

A base station channel is configured via PC MMI to transmit a carrier modulated by a framed pseudo-random sequence. Programmable attenuators and a multiple path simulator are introduced between the base station and the terminal set in factory test mode.

A second base station channel is used as a scrambler (co-channel, adjacent channel, other).

The terminal routes the demodulated speech frames to its PC driver where the a posteriori results are compared with the reference PN sequence to establish bit rate and frame errors.
The bit rate and frame errors are measured on the framed pseudo-random sequence for different values of simulated speeds, attenuation and intersymbol interference.
A network of result curves is subsequently traced.
An intersymbol interference above the threshold defined in specifications is simulated up to 1/2 bit time to evaluate the limits of the algorithm that is sued and to compare the results with simulated results.

13.4. Resources

13.4.1. Hardware resources

PC to control TRX in PC_MMI mode
PC to drive the RT in factory test mode and the IEEE test bench.
Multiple path simulator and its control PC.
Programmable IEEE attenuator SADPSP.
Spectrum analyser
Mini Faraday cage to insulate the RT from base stations.

14. Cell selection test

This clause defines the conformance tests required to validate the cell reselection function in the radio subsystem.

14.1. Pre-integration tests in single-BS configuration

14.1.1. Objectives

The objectives are:

- to test scanning mechanisms that trigger CRSEL (the RT remains on the CCH for these tests);
- to validate applicable numeric values.

14.1.2. Test methods

The SSI platform is equipped with a single TETRAPOL network base station and therefore only one CCH liable to be received by RT. This does not create any particular problems for tests since only the numbers of TCH and CCH channels numbers are broadcast in BS_INFO messages with no signal, or no information at all. These tests are designed to trigger cell reselection conditions on all levels. The RT subsequently returns to the only CCH it receives.
The BSSim test tasks that simulate the transport protocol management application charged with broadcasting BS_INFO messages, and the registration application are started up manually for all the tests. For tests requiring active RT presence on the CCH, the test task that simulates the temporary open channel application is started manually.
BSSim provides the ability to define BS_INFO with 0 , 3 , 7, 11 or 15 neighbours. The values of basestation_thresholds for each CCH can be dynamically changed by operator commands.
The power levels of the different CCH (serving and neighboring) are independently tuned via manual attenuators.
The test run is monitored on both the BSSim screen where RT registration and synchronisation following CRSEL are displayed, and on the supervisor console where SUP program traces are displayed with the power threshold levels of all the CCH and the protocol traces following registration or resynchro requests.

14.1.3. Tested points

The following points were tested in a single-BS configuration:
TEST 1:

- test objectives in idle/CCH and active/TCH conditions, to test the BS_INFO message is received with at least one neighbouring CCH;
- expected result: RT measurement requests for each neighbour at least every [15]s.

TEST 2:

- test objectives in idle/CCH and active/TCH conditions. To test that BS_INFO is received with 0 neighbours;
- expected result: neighbours are not scanned.

TEST 3:

- test objectives: to check that BS_INFO changes are taken into account in CCH idle status;
- expected result: on waking up the RT should request measurements for the CCH contained in the new BS_INFO.

TEST 4:

- test objectives: to test CRSEL starting conditions by increasing a neighbour's power level (by lowering the basestation-threshold by [15] dB) in active/CCH and idle/CCH conditions (a permanently active CCH condition is obtained via the OBSERVE ERROR RATE menu);
- Expected result: an RT sleeping on CCH should start CRSEL. An RT active on TCH should not start CRSEL since the implementation is restricted in terms of system specification.

TEST 5:

- test objectives: to validate the minimum time (T117) of CRSEL starting conditions;

- expected result: if a neighbour's power level is better for a time greater than T117, the RT should start CRSEL, else the RT does not start CRSEL.

TEST 6:
- test objectives: to check the behaviour of a fixed radio RT or following base station forcing in favorable CRSEL conditions;
- expected result: the RT in question does not start CRSEL.

14.1.4. Restrictions

The times given in tests are approximate.

14.2. Multi-BS application tests

14.2.1. Objectives

The objectives are:
- to test cell reselection in a single network configuration and all cases of terminal activity (reception without conversation, reception with conversation, transmission);
- to check application behaviour after the CRSEL function is overlaid.

14.2.2. Test methods

Multi-BS tests use the 4 channels of the network base station as 3 CCH and one TCH, with three BSSim . This is made possible by installing an additional board between the radio channels and the BSSim SIC board channel controllers. The additional board redistributes the base station clocks and direct the signal from each channel to its SIC controller board. The multi-BS is therefore multi-CCH and the same base station identifier broadcast in the BCH for all the CCH. A multi-BS configuration is simulated by scrambling each CCH differently to force registration.
In this configuration, the clocks of each CCH are necessarily synchronised. This is a restriction compared to a real case. This restriction does not affect real cell reselection since the CRSEL function does not perform demodulation but only measurements.
The TRU is controlled by the handset. The BSSim is used with the same manually initiated test tasks as in the single BS configuration. Trace information are displayed on the supervisor console.
The different CCH power levels (serving and neighbouring) are tuned independently via manual attenuators.

14.2.3. Tested points

The tests described below check RT's behaviour during an application transaction when intermittent CRSEL conditions (neighbour's power level better for at least 16s) or long term conditions occur (neighbour's power level better for more than 16s).
CRSEL and temporary open channel: test 1
- Test objectives: case of RT subjected to intermittent CRSEL conditions. The RT selects a temporary open channel and goes to that channel.
- Expected result: the RT remains on the CCH.

CRSEL and temporary open channel: test 2
- Test objectives: case of RT subjected to long term CRSEL conditions. RT selects a temporary open channel and goes to that channel.
- Expected result: the RT reselects the new cell.

CRSEL and individual call: test 1:
- Test objectives: case of RT subjected to intermittent CRSEL conditions the RT calls another RT for an individual call.
- Expected result: the RT remains on the TCH.

CRSEL and individual call: test 2:
- Test objectives: case of RT subjected to long term CRSEL conditions, the RT calls another RT for an individual call.
- Expected result: the RT reselects the new cell.

CRSEL and emergency open channel: test 1:
- Test objectives: case of RT subjected to intermittent CRSEL conditions: the RT replies to an emergency call and goes to TCH.
- Expected result: the RT remains on the emergency TCH.

CRSEL and emergency open channel: test 2:
- Test objectives: case of RT subjected to long term CRSEL conditions: the RT replies to an emergency call and goes to TCH.
- Expected result: the RT reselects the new cell.

14.3. Multi-BS fading tests

14.3.1. Objectives

Fading tests are designed to validate the RT's behaviour in a real environment subject to disturbances such as speed, different power levels and phase turnover.
This validation test includes the verification of numeric values used in the CRSEL algorithm.

14.4. Test methods

The three available CCH were used for fading tests in the same way as application tests: 1 useful CCH where the TRU registered at the start of the test, 1 neighbouring CCH broadcasting on the same level as the first, a third greatly attenuated CCH is never selected by the RT.
The useful and neighbouring CC are faded at the same simulated, but decorrelated speed, emulating real conditions, the third CCH is not faded.
The fading simulator provides the ability to simulate the effect of multi-path propagation at different speeds (from 0 to [200] Km/h) and with variable attenuation to observe the effects of peaks and troughs in the field received by RT. Phase turnover was also observed.
The fading simulator is also used to attenuate the neighbouring CCH and force RT registration on the useful CCH determined at the start of the test.

14.4.1. Tested points

Test objectives: to check, in view of fading, the [15] dB value corresponding to the minimum power threshold triggering the start of CRSEL.
Expected result: no parasite CRSEL when the power threshold budget is < [15] dB.
The initial power level was [-80] dBm and the basestation_threshold was set at [-104] dBm: to avoid detachment conditions.

Table 16: Test cases

Speed ---> Power threshold	1.7 Km/h	2.8 Km/h	5.8 Km/h	20 Km/h	62 Km/h	96 Km/h
0 dB	X	X	X	X	X	X
10 dB	X	X	X	X	X	X
12 dB	X	X	X	X	X	X
15 dB	X	X	X	X	X	X
17 dB	X	X	X	X	X	X
20 dB	X	X	X	X	X	X

Each test ran for about [10] minutes. These tests were performed wit an RT version that produced an error in serving CCH measurements. They will have to be redone with a corrected UTS version. None the less, the observed value comply with specifications.

History

Document history		
Date	**Status**	**Comment**
14 June 1996	First version	Version 0.0.1
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