

DMO TETRA Interoperability Certificate

Direct Mode Operation Repeater

Sepura, SC20, DMO Repeater

Cambridge, July 2022

Latest Certified Repeater SW Release:	1791 015 08522
Latest Certified Repeater HW Release:	TP01STW

ISCTI (Istituto Superiore delle Comunicazioni e delle Tecnologie dell'Informazione) certifies that the Sepura SC20 DMO Repeater has been subject to interoperability testing for the features listed in the "Certified features" tables of this certificate with the following DMO Terminals Sepura SC20, Sepura STP9000, in accordance with the TETRA Interoperability Profiles, TIP compliance Test Plan and related TETRA interoperability requirement tables.

The certificate features of each DM Terminal acting as master during testing is highlighted in light blue.

The table lists all the available TETRA interoperability profiles, and summarizes the main functionalities of every profile according to the TETRA interoperability requirement tables.

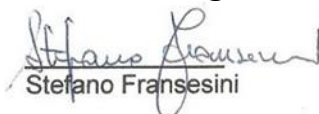
A feature is "Certified" when it has been successfully tested during the last test session with one of the testing method described in the TETRA process document part 1 (TPD001-01).

A breakdown into the feature details is given in the Feature Compliance Overview section of this certificate.

This certificate has been issued following a partially witnessed single session | fully witnessed single test session | multiple test session on July 2022. Detailed test results are listed in the Test Report associated to this Certificate. Details and explanation about the procedure used to provide verdicts are in the TIC process TPD001-01.

NOTE: the SC20 Repeater was tested as Repeater Type 1A only

IOP test engineer



Stefano Fransesini

Head of the Procedure

Radio Office Manager

Certified features

Note: The DM-MSA under test is highlighted in light blue background.

DMO Test Session Cambridge, July 2022 Sepura SC20	Sepura SC20	Sepura STP9000
TTR002-03 DMO Repeater – 1A		
Presence Signal	-	Certified
DM-MS authorization	-	Partial
Group Call	-	Certified
Individual Call	-	Partial
Call Maintenance	-	Certified
Status messages	-	Partial
SDS TL	-	Partial
TTR002-05 DMO AIE - Rep		
DMO AIE Encryption - via Repeater Type 1A	-	Partial

DMO Test Session Cambridge, July 2022 Sepura SC20	Sepura SC20	Sepura STP9000
TTR002-03 DMO Repeater – 1A		
Presence Signal	-	Certified
DM-MS authorization	-	Partial
Group Call	-	Certified
Individual Call	-	Partial
Call Maintenance	-	Certified
Status messages	-	Partial
SDS TL	-	Partial
TTR002-05 DMO AIE - Rep		
DMO AIE Encryption - via Repeater Type 1A	-	Partial

Feature Compliance Overview

The first pages of this certificate provide an indication about the main interoperable TETRA features for each TIP specification (as described in the TIC-RT). The main interoperable TETRA features result depend on a set of sub-feature, the outcomes associated to each sub-feature are directly derived from the analysis of the performed test cases.

The results associated to each feature and sub-feature are shown in the "Feature compliance report" table below. The certified DM Terminal acting as master during testing is highlighted in light blue. The main features are indicated with grey background and the associated sub-features (or second level features) have white background.

The outcome assigned to a sub-feature as shown on page 2, is derived by the Feature compliance report tables.

Outcome	Definition
Certified	All required tests have been performed and passed.
Partial	Not all the required test cases have been performed, but none have failed.
-	Feature cannot be certified e.g. it is not supported by at least one product, no tests were performed, or some tests were performed but at least one failed.


The outcome is derived from the verdict assigned to a sub-feature is the result of the analysis of the test case results listed in the Test Report. The verdict assigned to each sub-feature is derived from one or several test case results or test steps result, the TETRA Interoperability requirement tables (TIC-RTs) indicate the link between sub-features and test cases for the certified set of equipment capabilities (see Test Report).

Verdict	Definition
Passed	All mandated tests or steps of tests linked to this functionality (as per TIC-RT indication) are compliant with the TIP specification relevant to this feature.
Incomplete	Not all Mandated tests (as per TIC-RT indication) have been executed.
Failed	At least one of mandated test or steps of tests linked to this functionality failed to match the TIP specification relevant to this feature.

The verdict associated to the feature gives also indication about the method used to test that feature. The allowed testing Methods are listed in the table below, a complete description of the procedures and constraints associated to each of them can be found in the "TPD001-01 TETRA Interoperability Certification Process Description" document.

Testing Method	Description
Complete	All mandated tests associated to the feature have been executed.
Spot	Only a selection of the mandatory test cases associated to the feature has been executed during the test session. These tests are a subset of the tests performed on an equivalent software which has been "completely" tested against the same functionality on a different equipment, see manufacturer declaration in annex B.
Regression	Only a selection of the mandatory the test cases associated to the feature is executed during the test session. These tests are a subset of the tests performed on a previous version of the same software which has been "completely" tested in a previous test session against the same functionality, see manufacturer definition in the associated Test Report
Regression on spot	The regression method has been applied on the verdicts based on the spot testing method.
Witnessed	The TIP heading lines in the Feature Compliance Report indicate whether each TIP is partially or fully witnessed by the Certification Body. Additionally, for a partially-witnessed TIP, the number of witnessed test cases that passed is shown for each the feature and sub-feature. There may have been some un-witnessed passed tests and they will have been found to be successful based on the log file evaluation.

Depending on equipment capabilities declared by the manufacturer, some features or sub-feature cannot be tested. The following table describes meaning of the used abbreviation:

Indication	Definition
Not supported	The Repeater and/or MS do not support the minimum features required to verify these items
	The Result is not relevant (or needed) to verify the Repeater and/or MS features

ISCTI has made every effort to ensure that every result have been correctly evaluated in

accordance with the relevant TIPs, Test Plans and TIC-RTs. ISCTI has no liability for the test results, or towards the manufacturers.

The table on the following page lists HW and SW releases of DM Terminals under test in the test session and the used TIP specifications, Test Plans, and TIC-RTs.

This Certificate and Certificates from previous test sessions are available on the TCCA web site (<https://tandcca.com/interoperability/interoperability-certificates-and-test-reports/>).

The feature results are shown in the tables below.

Information on equipment under test and document references

Test Session Place/Date	Sepura, Cambridge July 2022
Repeater Type	Sepura SC20
Repeater HW release	TP01STW
Repeater SW release	1791 015 08522
DM Terminal 1 Type	Sepura SC20
DM Terminal 1 HW release	TP01STW
DM Terminal 1 SW release	1791 015 08522
DM Terminal 2 Type	Sepura STP9000
DM Terminal 2 HW release	PSYTW201T30WN00
DM Terminal 2 SW release	1791 015 02937



TIP Specs and TIP Compliance Test Plans	
Repeater	TTR002-03_v130_DRep1 IOP002-03_v130_DRep1 TIC-RT002-03_v121_DRep1
DAIE -Rep	TTR002-05_v100_DAIE IOP002-05_v110_DAIE TIC-RT002-05-3_v113_DAIE-Rep1

Feature compliance report

DMO Test Session Cambridge, July 2022 Sepura SC20	Sepura SC20	Sepura STP9000
TTR002-03 Repeater – Fully witnessed testing		
Presence Signal – Type 1A Repeater	Incomplete 0_pass_of_5	PASSED Complete 5_pass_of_5
Presence Signal on free channel	Incomplete 0_pass_of_1	PASSED Complete 1_pass_of_1
Presence Signal on occupied channel	Incomplete 0_pass_of_4	PASSED Complete 4_pass_of_4
DM-MS authorization – Type 1A Repeater	Incomplete 0_pass_of_8	Incomplete 5_pass_of_7
Usage Restriction Type	Incomplete 0_pass_of_6	Incomplete 4_pass_of_5
Validity Time	Incomplete 0_pass_of_2	Incomplete 1_pass_of_2
Group call – Type 1A Repeater	Incomplete 0_pass_of_6	PASSED Complete 6_pass_of_6
Intra-MNI Group Calls	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Inter-MNI Group Calls	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Use as parallel DM-MS for Group Call	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2

DMO Test Session Cambridge, July 2022 Sepura SC20	Sapura SC20	Sapura STP9000
Individual Call – Type 1A Repeater	Incomplete 0_pass_of_7	Incomplete 5_pass_of_7
Individual Call with Presence Check	Incomplete 0_pass_of_5	PASSED Complete 5_pass_of_5
Individual call without Presence Check	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2
Call Maintenance – Type 1A Repeater	Incomplete 0_pass_of_19	PASSED Complete 19_pass_of_19
Changeover	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Pre-emption	Incomplete 0_pass_of_6	PASSED Complete 6_pass_of_6
Procedures in Occupation	Incomplete 0_pass_of_6	PASSED Complete 6_pass_of_6
Procedures in Reservation	Incomplete 0_pass_of_7	PASSED Complete 7_pass_of_7
Status Messages – Type 1A Repeater	Incomplete 0_pass_of_16	Incomplete 12_pass_of_16
Intra-MNI Status Calls	Incomplete 0_pass_of_14	Incomplete 12_pass_of_14
Individual Status Calls	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Group Status call	Incomplete 0_pass_of_12	Incomplete 10_pass_of_12
Status sent in a Voice Call	Incomplete	PASSED

DMO Test Session Cambridge, July 2022 Sepura SC20	Sapura SC20	Sapura STP9000
	0_pass_of_6	Complete 6_pass_of_6
Status sent out of a Call	Incomplete 0_pass_of_8	Incomplete 6_pass_of_8
Use as parallel DM-MS for Status	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2
SDS TL – Type 1A Repeater	Incomplete 0_pass_of_12	Incomplete 8_pass_of_12
Group Addressed Intra-MNI SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Open TSI Addressed SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Individually Addressed intra-MNI SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Individually Addressed inter-MNI SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Multipart SDS-TL	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2
Use as parallel DM-MS for SDS-TL	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2
TTR002-05 (class 2) DMO AIE Encryption - via Repeater – fully witnessed testing		
DMO AIE Encryption - via Repeater Type 1A	Incomplete 0_pass_of_18	Incomplete 12_pass_of_18
Encrypted Group Calls	Incomplete 0_pass_of_4	PASSED Complete 4_pass_of_4
Encrypted Individual Calls	Incomplete 0_pass_of_4	Incomplete 2_pass_of_4

DMO Test Session Cambridge, July 2022 Sepura SC20	Sepura SC20	Sepura STP9000
Encrypted Status messages	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Pre-emption of encrypted activity	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Handling mismatched keys	Incomplete 0_pass_of_4	Incomplete 2_pass_of_4
SDS-TL messages	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2

Note: The DM-MSA under test is highlighted in light blue background.

DMO Test Session Cambridge, July 2022 Sepura SC20	Sapura SC20	Sapura STP9000
TTR002-03 Repeater – fully witnessed testing		
Presence Signal – Type 1A Repeater	Incomplete 0_pass_of_5	PASSED Complete 5_pass_of_5
Presence Signal on free channel	Incomplete 0_pass_of_1	PASSED Complete 1_pass_of_1
Presence Signal on occupied channel	Incomplete 0_pass_of_4	PASSED Complete 4_pass_of_4
DM-MS authorization – Type 1A Repeater	Incomplete 0_pass_of_8	Incomplete 5_pass_of_7
Usage Restriction Type	Incomplete 0_pass_of_6	Incomplete 4_pass_of_5
Validity Time	Incomplete 0_pass_of_2	Incomplete 1_pass_of_2
Group call – Type 1A Repeater	Incomplete 0_pass_of_6	PASSED Complete 6_pass_of_6
Intra-MNI Group Calls	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Inter-MNI Group Calls	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Use as parallel DM-MS for Group Call	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Individual Call – Type 1A Repeater	Incomplete 0_pass_of_7	Incomplete 5_pass_of_7
Individual Call with Presence Check	Incomplete 0_pass_of_5	PASSED Complete 5_pass_of_5
Individual call without Presence Check	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2
Call Maintenance – Type 1A Repeater	Incomplete 0_pass_of_19	PASSED Complete 19_pass_of_19
Changeover	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2

DMO Test Session Cambridge, July 2022 Sepura SC20	Sepura SC20	Sepura STP9000
Pre-emption	Incomplete 0_pass_of_6	PASSED Complete 6_pass_of_6
Procedures in Occupation	Incomplete 0_pass_of_6	PASSED Complete 6_pass_of_6
Procedures in Reservation	Incomplete 0_pass_of_7	PASSED Complete 7_pass_of_7
Status Messages – Type 1A Repeater	Incomplete 0_pass_of_16	Incomplete 12_pass_of_16
Intra-MNI Status Calls	Incomplete 0_pass_of_14	Incomplete 12_pass_of_14
Individual Status Calls	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Group Status call	Incomplete 0_pass_of_12	Incomplete 10_pass_of_12
Status sent in a Voice Call	Incomplete 0_pass_of_6	PASSED Complete 6_pass_of_6
Status sent out of a Call	Incomplete 0_pass_of_8	Incomplete 6_pass_of_8
Use as parallel DM-MS for Status	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2
SDS TL – Type 1A Repeater	Incomplete 0_pass_of_12	Incomplete 8_pass_of_12
Group Addressed Intra-MNI SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Open TSI Addressed SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Individually Addressed intra-MNI SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Individually Addressed inter-MNI SDS-TL	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Multipart SDS-TL	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2

DMO Test Session Cambridge, July 2022 Sepura SC20	Sapura SC20	Sapura STP9000
Use as parallel DM-MS for SDS-TL	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2
TTR002-05 (class 2) DMO AIE Encryption - via Repeater – fully witnessed testing		
DMO AIE Encryption - via Repeater Type 1A	Incomplete 0_pass_of_18	Incomplete 12_pass_of_18
Encrypted Group Calls	Incomplete 0_pass_of_4	PASSED Complete 4_pass_of_4
Encrypted Individual Calls	Incomplete 0_pass_of_4	Incomplete 2_pass_of_4
Encrypted Status messages	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Pre-emption of encrypted activity	Incomplete 0_pass_of_2	PASSED Complete 2_pass_of_2
Handling mismatched keys	Incomplete 0_pass_of_4	Incomplete 2_pass_of_4
SDS-TL messages	Incomplete 0_pass_of_2	Incomplete 0_pass_of_2

Note: The DM-MSA under test is highlighted in light blue background.

Annex A

List of Revisions of the Certificate		
Date	Ver.	Modification
Date	1	First published version
Date 2	2	r Reason A
Date 3	3	Reason B

IOP Test Engineer

Radio Office Manager