



# TETRA AND TEDS INTEROPERABILITY TESTING

## WHY TETRA INTEROPERABILITY TESTING IS NECESSARY

To ensure that TETRA remains a truly open and competitive multi-vendor market, a robust and independent interoperability testing programme is critical. With over 750 interoperability test certificates issued, the TETRA Interoperability (IOP) Certification Process is the most rigorous of its kind in the critical communications world. Interoperability between vendors is accomplished by:

- Creating TETRA Interoperability Profile (TIP) specifications
- Creating TIP Compliance Test Plans
- Performing TETRA Interoperability testing

The purpose of TETRA Interoperability testing is to verify that tested products comply with the functionalities and requirements defined in TIP specifications.

Testing does not cover functionalities outside TIP specifications or man-machine interface (MMI) related issues.

Testing is supervised by the Certification Body, which also issues certificates for tested products.

The Certification body is an independent party, appointed by the TETRA & Critical Communications Association (TCCA).

Final acceptance for TIP Compliance test plans is given by the TCCA Technical Forum where test plans undergo the similar kind of process as TIP specifications.

## WHAT TETRA IOP INVOLVES

The TIP Certification process verifies the interoperability of two pieces of equipment. This equipment consists of a pair of items e.g. Switching and Management Infrastructure (SwMI) and a mobile station (MS), either from the same manufacturer, or from different manufacturers.

The certification is specifically for the combined operation of a specific version of each of the two pieces of equipment working together.

The TCCA has developed a particular tool (called TIC-RT) to support the TETRA Interoperability testing and certification process, as follows:

- Before the start of the session, each of the manufacturers declares the TIP features supported by his equipment.
- Based on these declarations, the tool will select the tests relevant for the combined operation of the two pieces of equipment.
- The relevant tests will be executed under supervision of the Certification Body.
- After the relevant tests have been executed the Certification Body will examine the logs and enter the results of the testing into the tool.
- The tool will then generate the information to be used in the Certificates and Test Reports.
- The Certification Body publishes the Certificates and Test Reports at the TCCA web-site.

## THE MAIN TYPES OF IOP TESTS

### **Multi-session**

SwMI manufacturers are obliged to offer this type of testing at least every third year.

A SwMI manufacturer invites all MS manufacturers to participate in the IOP test session.

MS manufacturers who are interested in participation register for the session.

Testing takes place in a sequence agreed with the various manufacturers.

The Certificates and Test Reports will be published at the same time for all participating MS manufacturers.

The Certification Body is contractually obliged to publish the Certificates and Test Reports within 45 working days after the end of the session, although a longer time is allowed during the holiday seasons. The time for publication is often shorter.

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### **Single-session**

Mainly intended to certify new MS types and versions.

A SwMI and an MS manufacturer agree to have a single session.

The testing takes place, and can be fully or partially witnessed by the Certification Body.

**Note:** For partially witnessed Single-session, the manufacturers will first have to perform all the relevant tests, and send the logs to Certification Body for their evaluation, and selection of the tests they wish to witness.

The partially witnessed Single session is not used very much because many operators do not accept this type of Certificates as basis for procurement.

The Certification Body is contractually obliged to publish the Certificates and Test Reports within 20 working days after the end of the session.

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### **Spot testing**

Spot check testing can be performed when a manufacturer has different products with compatible software to be tested.

The purpose of spot check testing is to show, with a sufficient level of confidence, that the product and the reference perform the same functionalities in a compliant manner, without the need to re-execute the set of tests previously performed using "Full testing".

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### **Regression testing**

The purpose of regression testing is to show, with a sufficient level of confidence, that a certified product with a new software version still performs in a compliant manner with the functionalities already certified, without the need to re-execute the set of previously performed tests using Full testing.

# FAQS

## WHY IS LLC OPTIMISATION A MANDATORY REQUIREMENT FOR TEDS IOP?

LLC Optimisation was added in v3.6.1 of the ETSI standard (EN 300 392-2) as a mandatory requirement for TEDS.

It was added, primarily because sending of multiple acknowledgement blocks for one TL-SDU was not described in the previous versions of EN 300 392-2, and it was necessary to handle this (although infrequent) situation.

Without this, the implementations were dependent on manufacturers interpretation of certain requirements in EN 300 392-2.

The problem could not be resolved without creating a backward compatibility issue, and the solution became part of the LLC Optimisation, which is described in CR524 to v3.5.1 of EN 300 392-2.

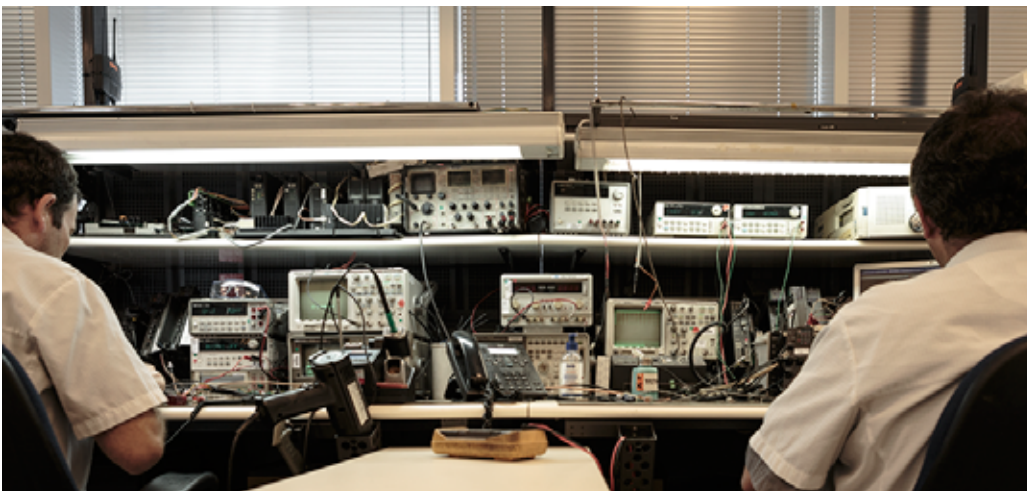
Interoperability problems will happen for TEDS implementations if either SwMI or MS does not use LLC Optimisation.

Interoperability problems may also arise if neither SwMI nor MS use LLC Optimisation, depending on the manufacturers' interpretation of the pre-CR524 version of the standard.

## HOW COME VENDORS ARE ALLOWED TO PROVIDE TEDS IOP CERTIFICATION IN SPITE OF THEIR LACKING SUPPORT FOR LLC OPTIMIZATION?

To allow IOP certification of pre-CR524 implementations until CR524 has been implemented by all manufacturers, the possibility that neither SwMI nor MS use CR524 is maintained as an interim possibility.

It is expected that this possibility will be removed, when the IOP Test Plan and the associated TIC-RT has been updated to align with v4.0.0 of the Packet Data TIP. **This is an imminent change that will require non-compliant vendors to upgrade software in their radios as well as in their SwMI – at considerable cost to their customers!**



## WHY ARE TEST RESULTS PRESENTED FOR SOME CASES AND “NOT SUPPORTED” STATED IN OTHERS

In the case of TEDS IOP testing, here is how the results should be presented

TEDS	WHEN ARE TEST RESULTS PRESENTED	WHEN IS “NOT SUPPORTED” STATED
TEDS with Context Activation	Either both SwMI and MS support LLC Optimisation, or neither SwMI nor MS do support LLC Optimisation	Either SwMI supports LLC Optimisation and MS does not support LLC Optimisation, or SwMI does not support LLC Optimisation and MS supports LLC Optimisation
TEDS Data Transmission, using LLC Optimisation	Both SwMI and MS support LLC Optimisation	Either SwMI or MS or both do not support LLC Optimisation
TEDS Data Transmission, not using LLC Optimisation	Neither SwMI nor MS do support LLC Optimisation	Either SwMI or MS or both support LLC Optimisation
TEDS Cell Reselection, using LLC Optimisation	Both SwMI and MS support LLC Optimisation	Either SwMI or MS or both do not support LLC Optimisation
TEDS Cell Reselection, not using LLC Optimisation	Neither SwMI nor MS do support LLC Optimisation	Either SwMI or MS or both support LLC Optimisation

Let’s look at an example:

### IOP Certification MTM5400 and Other vendor SwMI

TEDS	
TEDS with Context Activation	Not Supported
TEDS Data Transmission, using LLC Optimisation	Not Supported
TEDS Data Transmission, not using LLC Optimisation	Not Supported
TEDS Cell Reselection, using LLC Optimisation	Not Supported
TEDS Cell Reselection, not using LLC Optimisation	Not Supported

The “Not supported” is recorded for all the tests because while the Motorola MTM5400 supports LLC Optimisation, the other vendor SwMI does not.