

Standard Interconnection Agreement



Annex H Technical Manual

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1 INTRODUCTION

This Manual is a description of those features of the Operator Network that are relevant to an operator seeking Interconnection. It describes the various Network elements and the services that are supported/offered by these elements as part of the RIO.

This Manual does not describe the details of any network that may result from an Interconnection with an operator. These details are contained in the Network Plan at Annex E of the Interconnection Agreement and/or in the Technical Framework Document. Furthermore, this Manual does not describe the operation processes which underline the provision, operation or maintenance of the Interconnection Network provided to another Operator. These are contained in the Operations and Maintenance Manual.

Due to the nature of transmission and signalling, the network is continually evolving to support new features and functionality. Enhancements which are material to the information in this Manual will result in a new issue.

2 SCOPE

This Manual describes the essential network functionality required to facilitate the planning and execution of an efficient Interconnection with an operator.

3 SYMBOLS & ABBREVIATIONS

For the purposes of this Manual, the abbreviations contained herein shall have the meaning assigned to them in Annex A of the Interconnection Agreement.

4 DEFINITIONS

For the purposes of this Manual the words and expressions in this Manual shall have the meaning assigned to them in Annex A of the Interconnection Agreement.

5 EPIC NETWORK

5.1 General Network Description

Epic's network is based on two national / international gateways situated at B'Kara and St. Venera. Operator interconnection with the Epic network is via these gateways. SIP interconnections with the Operator will be distributed equally between all gateways for a better conveyance of traffic within the Epic Network. Full interconnect details are available in the Technical Framework Document ('TFD') attached to the Interconnection Agreement.

5.2 Traffic routing

Principles of traffic routing to and from Epic's Interconnection Nodes are described in Annex E of the Interconnection Agreement.

5.3 Numbering

All numbering plans will be in line with the National Numbering Plan.

6 SIGNALLING NETWORK

6.1 Introduction

This section primarily contains information on Epic's Signalling network -SIP parameter settings, B-number format and Call Diversion.

6.2 Signalling System description

6.2.1 SIP

Epic's SIP implementation complies with the following standards:

3GPP TS 29.163 ISUP to SIP Mapping

RFC 2327 SDP

RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals

RFC 2976 SIP INFO Method

RFC 3311 SIP UPDATE Method

RFC 4566 Session Description Protocol

RFC 2806 URLs for telephone calls

RFC 3261 (V2) Base SIP RFC

RFC 3262 PRACK

RFC 3263 Session Initiation Protocol (SIP): Locating SIP Servers

RFC 3264 Answer Offer model

RFC 3323 SIP Privacy

RFC 3324 Short Term Requirement for Network Asserted Identity

RFC 3325 Trusted Private Networks and SIP

RFC 3824 Using E.164 numbers with SIP

RFC 3840 Indicating user agent capabilities

RFC 4028 Session Timer

SIP Option Method as keepalive

Epic reserves the right to implement SIP screening masks to reduce the level of messages supported on an interconnection to that required by the commercial Interconnection Agreement.

Epic makes use of the SIP OPTIONS messages to ensure reachability of the end point. These SIP OPTIONS need to be answered with a SIP 200 OK message in order for the Epic gateways not to flag the operator trunk as unavailable.

6.3 Call Diversion

The presence of redirection information (including diversion hop counter), original called number and redirecting number in the SIP INVITE identifies the call as a diverted call. Currently only **five call diversions** are allowed on any call in Epic's Network.

Calls that are diverted are labelled as such in the optional parameter 'redirection information' field of the INVITE message, when sent to Operator's network. The Operator will identify diverted calls outgoing to other Operators in a similar way.

Call-looping resulting from call diversions across the interconnection is prohibited.

6.3.1 Outgoing calls from Operator Network

The Called Party Number parameter shall be coded in E.164 format or national format depending on the interconnection type. The relevant fields (Numbering plan) shall be coded as described in Table 6b.

Numbering format	Address signals
National	Calls originated on the Parties' local network towards Maltese numbers. The Called Party Number shall commence with Number Portability Routing Prefix and the STD code of the addressed user without any leading zeros. In case Number Portability Node will be unavailable, the address signals shall be the STD code of the addressed user without any leading zeros.
International	Calls originated on the Parties' local network towards international numbers will be in E.164 format. Address signals shall commence with the country code of the addressed network e.g. '44' for UK. In the case of calls towards Maltese numbers received from non-Maltese operators, the Called Party Number must commence with the Maltese country code (+356).

Table 6(b): Numbering and address format of the Called party number parameter

6.3.2 Incoming calls to the Operator Network

The format of the Called Party number parameter fields shall be as defined in Table 6(b).

6.3.3 Examples of calls Incoming from Operators to Operator

- For a local number '20994444': send '051020994444'
- For an international number '00 1 671 4444 444': send '+1 671 4444 444' or '00 1 671 4444 444'

7 SERVICE QUALITY

7.1 Grade of Service from and towards Operator Interconnection Nodes

All Interconnection Paths between the Operator and the Epic Interconnection Nodes will be dimensioned based on expected both way busy hour offered traffic. Traffic which has been blocked on the first choice routes will overflow on the other routes in the interconnection network, from both sides.

The network will offer high quality of service under normal conditions and will offer a degraded service to Epic under bursty/failure conditions, such that the majority of call attempts will be successful.

In case of failure of a single Interconnection Node or Transmission system, resiliency could be attained via redundancy in the physical links set up, or via sufficiently secured fallback solutions over the public internet, depending on the agreed routing priority between the parties.

7.2 General Quality of Service Parameters

The following service quality parameters are applicable to both Operator's and Epic's Networks. The parameters represent a minimum set, to be measured and recorded by both parties.

The current state of implementation of systems to measure and report on these parameters shall be confirmed between Operator and Epic. Both Parties shall agree on the timetable for the introduction of the measurements of these parameters.

Additional service quality parameters may be introduced in line with the development of systems to gather

and process the appropriate data.

7.2.1 Traffic Performance Parameters

Trk Grp Id	The ID number of the trunk group
Simultaneous calls	The actual number of simultaneous calls in service at the time of measurement
Calls per second	The actual number of calls set up in a second at the time of measurement
Time	The time of day at which the busy hour commences
(Busy Hour) Traffic	The total traffic intensity carried by the trunk group, measured in Erlangs during the busy hour
ASR%	The answer seizure ratio, defined as the number of answered seizures to total seizures i.e. $ASR\% = \frac{\text{answered seizures} \times 100\%}{\text{Total seizures}}$
NER	The Network Effectiveness Ratio (NER) measures the ability of a network to deliver a call to the called terminal. Busy signals and other call failure due to user behaviour are counted as "successful call delivery" for NER calculation purposes. Unlike ASR, NER excludes the effects of customer and terminal behaviour. $NER = \frac{100 \times (\text{'Answered Calls'} + \text{'User Busy'} + \text{'Ring No Answer'} + \text{'Terminated Reject'})}{\text{Total seizures}}$

8 TEST REQUIREMENTS

8.1 Introduction

Testing is an essential part of the interconnection process. This clause describes the methodology applied by Operator to testing and the various types of tests that will be applied.

8.1.1 Testing and Bringing Into Service

Both parties shall agree a test plan which shall define the relationship between individual tests and the timeframe for carrying out the tests. A separate test plan shall be defined for each new or additional service supplied.

8.1.1.1. Transmission tests

These tests shall have the objective of proving the error-free transport of information between the routing elements of the Operator Network and the Epic Network in accordance with the standard BER Transmission test procedures described in Appendix A, Annex 1.

8.1.1.2. Routing tests

The routing tests shall be agreed between both operators whereby Epic will provide its standard set of tests however supplementary tests may be added.

The end-to-end tests have the objective of proving the correct operation of a set of supplied services between the two parties. These tests shall examine the correct operation of:

- network routing;
- any number translation or Service features invoked;
- the correct operation of any specific end-to-end services;
- any other specific testing that may be necessary.

The test plan agreed between Operator and Epic at the start of the provisioning process, shall define which of the specific tests will be carried out. These tests selected depend on the type of service being supported over the interconnection.

The test document shall be part of the TFD available which shall form a part of the Interconnection Agreement.

8.1.2 Billing tests

Test will be carried out to:-

- a) Verify call records.
- b) Validate both Epic billing/invoicing procedures/systems.

This will be achieved by generating a controlled set of test calls at the appropriate level (primary, secondary & tertiary). The associated Call records generated by each Party for each call type will be checked to ensure they are correct in all details. The invoice produced by both Parties will then be compared for final verification of both Billing Systems.

A test document will be produced for each Party. The test document shall be part of the TFD available with this agreement.

8.1.2.1. Testing Methodology:

Testing will be carried out over an agreed test period. This should be agreed by testing personnel and documented in the test sheet summary available in TFD. During the test period the tests performed will cover (i) network connectivity (ii) Additional voice calls scenarios. All successful calls made to the Epic Network will generate CDRs.

The testing methodology will consist of the steps detailed below.

8.1.2.1.1. Network Connectivity

This step involves Engineers at Operator and Epic making a series of tests to confirm the correct connectivity and resiliency of the interconnection.

The final test list is available as part of the TFD attached to the Interconnection Agreement.

8.1.2.1.2. Call Generation

This step involves test personnel at Operator and Epic making a series of test calls over the Interconnection Paths. The details of these calls will be recorded manually on test recording sheets.

For a successful call, the start time, answered time and duration of the call will be recorded. The results shall be checked for billing purposes.

The test list will be exchanged between the two operators.

NOTE: The hang up time may be different for each end of the call. Both parties should time independently of each other, and complete the appropriate test recording sheet.

8.1.2.1.3. CDR production and extraction at Operator mediation Site

All call records generated during the testing period will be collected from the Operator mediation sites and transferred to the Operator billing centre.

8.1.2.1.4. CDR production and extraction at the Epic Network

Epic will collect CDRs for the duration of the testing period. The call records produced shall contain as a minimum the following fields.

- A number
- B number
- Call Start Time
- Call Duration

8.1.2.1.5. Invoice Production at Operator

The Operator billing system will produce an invoice for all calls made during the test period. This will be presented to Epic for information purposes only.

8.1.2.1.6. Reconciliation of Calls

Copies of the test recording sheets will be exchanged between Operator and Epic. The details of the test calls will be compared and both parties will produce a report outlining any discrepancies or anomalies.

8.1.2.1.7. Invoice Verification

Epic will examine the trial invoice produced and return their comments to Operator.

8.1.2.2. Acceptance Sign-Off

When both parties have reached agreement on the two aspects of the testing:

Part A.....Manually generated calls

Part B.....Invoice Production

An overall sign-off to the test will be completed.

8.1.3 Principles

This section describes the following:

- interconnection scenarios that will be presented to Operator and Epic.
- tests to be completed for each scenario.

Note that all test mentioned in the following sections will be provided to the other Operator as part of the TFD.

8.1.3.1. 1st Interconnection Scenario

This scenario involves Epic's first interconnection to Operator's exchange:

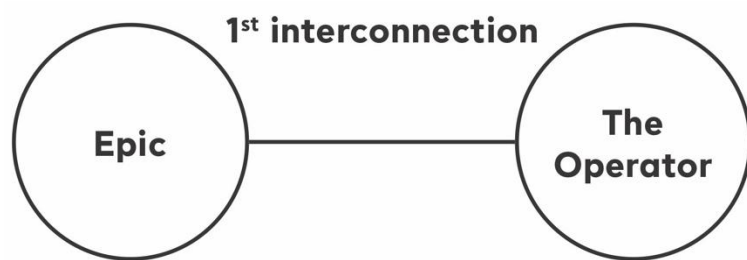


Figure 9(a): 1st interconnection Scenario

8.1.3.2. Additional Interconnection Scenarios

When opening an additional interconnection, two new scenarios are possible:

- a) further interconnections are provided to Operator from a different Epic gateway, see Figure 9(b);
- b) a new but identical node is introduced by Operator and this node is interconnected to the existing Epic gateways, see Figure 9(c).

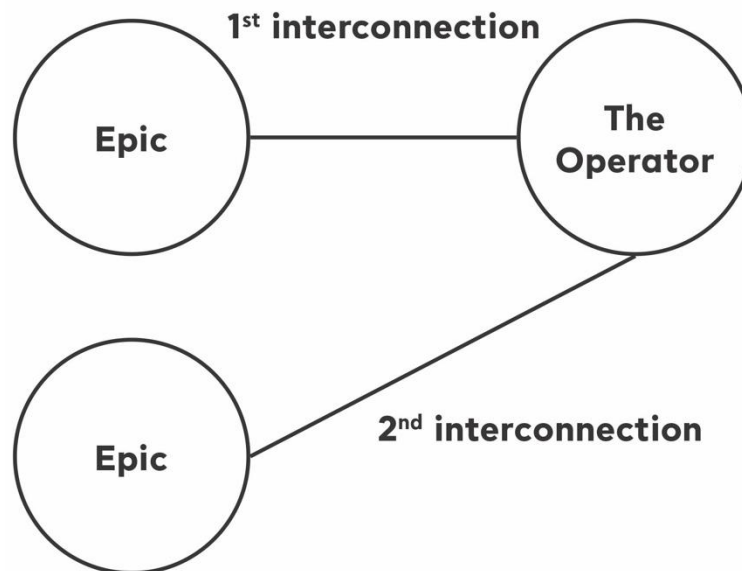


Figure 9(b): 2nd Interconnection scenario (a)

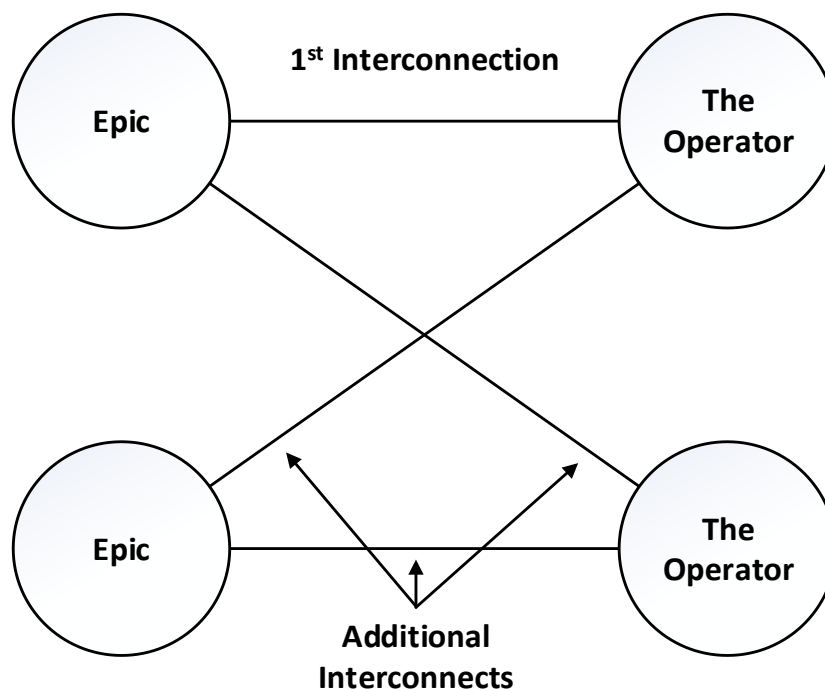


Figure 9(c): 2nd Interconnection scenario (b)