

NETWORK CONFORMITY STANDARDS SYSTEM & PROCEDURES

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1.0 BACKGROUND

- 1.1 Consequent to the liberalization of the Telecom Sector and subsequent dawn of the NGN era, TEC had to transform itself into an independent technical organization to draw up standards and specifications for seamless inter-working of a multi-operator convergent network supporting multimedia services. Thus TEC was required to redefine its role to benefit the entire telecom industry rather than limiting it to a single incumbent as was traditionally the case before liberalization. Convergence of technologies in the Telecom, IT, Broadcasting, and Entertainment sectors, resulted into horizontal and vertical integration of market segments, and this further prompted the need for change. It is now imperative to ensure seamless working in a converged network capable of carrying multimedia communications and applications. The need to specify Network-Network Interfaces (NNI) and User-Network Interfaces (UNI) in such a network by an independent standards organization is of paramount importance.
- 1.2 TEC was thus driven to adopt a vision consistent with the new demands of a competitive telecom environment wherein it would leverage its capability as a “Centre of Excellence” in telecom to position India as a lead Telecom Knowledge and Manufacturing Hub of Asia Pacific nations, by driving Telecom Standards, Manufacturing Support and Network Building Skill-sets in the interests of this region and market. TEC would now have to deal with visualization and strategic positioning of future telecom sector in India, technological forecasting, assessment, and specification of next generation network elements. Conformity to standards would play a crucial role in the interoperability between network elements and quality of service. With liberalization of telecom, lot of expertise is available with different operators as well as manufacturers and vendors. Adoption of standards and the associated conformity tests would have to be undertaken by TEC through a process of technical consultation by pooling together such industry expertise.
- 1.3 Telecom Commission has recognised the need for network requirement standards and has approved the process of certification in mandatory conformity tests for all equipment. TEC would recognize, as per International best practices, other test labs in India and abroad for the purpose of speedy and efficient testing and certification process. Tests would be carried out routinely by Conformity Assessment Bodies (CAB) duly designated by TEC.
- 1.4 Conformity tests would be related not only to requirements for interface specifications to meet interoperability and interconnectivity needs, but also for EMI/EMC, safety, security and quality requirements. These requirements are known as “Generic Requirements”. Network elements that meet conformity tests

for these generic requirements would be eligible to get a “TEC certification of Type Approval” that shall permit their utilization in Indian telecom network.

- 1.5 State-of-the-art testing facilities for evaluation of telecom equipment against mandatory requirements are already being implemented and NGN labs are being setup in TEC. These labs would provide a test bed primarily for finalising test processes and procedures for standardizing tests.
- 1.6 Further, it is envisaged to globalize the process through Mutual Recognition Agreement (MRA) with other countries.

2.0 ROLE OF TEC

In the light of aforesaid background, role of TEC is to bring together the Telecom Industry to decide the standards that network elements and services would have to conform to in order to make Indian Telecom Network deliver acceptable service in a multioperator environment at par with global standards. TEC, therefore, has created a more interactive mechanism, which includes all stakeholders, for formulation of Generic Requirements (GR) for network elements, Interface Requirements (IR) for interfaces between different network elements, Service Requirements (SR) for networks and services and Test Schedule and Test Procedures (TSTP) thereof.

3.0 DEFINITION AND STRUCTURE OF DOCUMENTS

- 3.1 Documents are classified under following broad categories.

3.2 GENERIC REQUIREMENTS

- 3.2.1 Generic Requirements (GR) for a telecom network element or a set of network elements, are its requirements to work seamlessly in Indian Telecom Network. Requirements are classified in two parts – minimum “mandatory” requirements and “desirable” requirements. These requirements refer to the following
 - a. Interconnectivity and interoperability requirements
 - b. Quality requirements
 - c. EMI/EMC requirements
 - d. Safety requirements
 - e. Security requirements
 - f. Any other equipment specific requirements that are considered mandatory
 - g. Desirable requirements, if any
- 3.2.2 GRs shall be assigned specific numbers for ease of identification. TEC shall concurrently create Test Schedules and Test Procedures for every GR in order to test and validate network elements.
- 3.2.3 GRs may also consist of key generic functionalities and implementations that can become a differentiating factor for a user, in selecting network elements. Clauses that describe such requirements shall be termed as “Desirable” and shall be enumerated in a separate chapter. Desirable clauses are not mandatory but are considered generic in the design scheme of a network element. Care shall be taken

to ensure that desirable clauses belong to the category of “state-of-the-art” and shall not be specific to a particular Service Provider’s routine requirements.

3.2.4 GR FORMAT

3.2.4.1 Format of a GR shall be as under

Contents

History Sheet

1. Introduction (to network element, or system)
2. Description (of network element, or system in terms of components, architecture, etc.)
3. Functional Requirements
4. Interconnectivity and Interoperability Requirements
5. Quality requirements
6. EMI/EMC requirements
7. Safety requirements
8. Security requirements
9. Other Mandatory Requirements
10. Desirable Requirements

Glossary

3.2.5 Interface protocols, particularly at higher layers specific to a GR, may be detailed within it. However, there may be interface protocols, mostly at lower layers, such as CCS No. 7 signalling, ISDN PRI, LAN and WAN interfaces, etc., which are commonly used by many network elements, which shall be defined separately as Interface Requirements (IR), and can be referenced by different GRs, whenever needed.

3.2.6 Similarly, Quality, EMI/EMC, Safety and Security requirements, which are common in various GRs, may also be defined separately so that they can be referenced by different GRs as needed.

3.2.7 GR NUMBERING

3.2.7.1 GRs shall be numbered in following format

No: TEC/GR/AA/BBB-xxx/vv/MMM-YY

TEC: Telecommunication Engineering Centre

GR: Generic Requirements

AA: Network Element Family name* (alphabets)

BBB: Network Element (Child) name (alphabets)

xxx: Child reference (alpha-numeric value)

vv: Version reference (numeric value)

MMM: Month in which GR is released

YY: Year in which GR is released

- * SW for Switching Equipment
- TX for Transmission Equipment
- PI for Passive Infrastructure Equipment
- IT for Information Technology Equipment
- CP for Customer Premises Equipment

For example: GR for MUX equipment released in May, 2008 shall be numbered as TEC/GR/TX/MUX-001/01/MAY-08

3.3 INTERFACE REQUIREMENTS

3.3.1 Interface Requirements (IR) refer to the requirements of an interface between two Network Elements at different layers of protocol stacks as applicable. Interfaces are defined at different layers for convenience of peer-to-peer communication

- a. Layer 1 Physical (E1, STM-n, Ethernet, etc.)
- b. Layer 2 Link (Ethernet, PPP, etc.)
- c. Layer 3 Network (IP, Q 931, etc.)
- d. Layer 4 Transport (TCP, UDP, etc.)
- e. Layer 5 Sessions (Call setup, teardown, etc.)
- f. Layer 6 Presentation (ASN.1, etc.)
- g. Layer 7 Applications (Telnet, FTP, www, mail, CORBA, etc.)

3.3.2 IRs are part of generic requirements that describe the interoperability specifications to be met by different types of equipment owned and maintained by subscribers or service providers and which are to be interfaced with equipment or network of Telecom Service Providers without degrading the network. Interface Requirements that are commonly used by multiple GRs are separate documents..

3.3.3 TEC shall concurrently create Test Schedules and Test Procedures for every IR, in order to test and validate network interfaces.

3.3.4 IR NUMBERING

3.3.4.1 IRs shall also be assigned specific numbers for ease of identification, as follows

No: TEC/IR/BBB-xxx/vv/MMM-YY
TEC: Telecommunication Engineering Centre
IR: Interface Requirements
BBB: Interface name (alphabets)
xxx: Interface reference (alpha-numeric value)
vv: Version reference (numeric value)
MMM: Month in which IR is released
YY: Year in which IR is released

3.4 SERVICE REQUIREMENTS

3.4.1 Service Requirements (SR) detail the services and network related requirements for specific applications, which should be met by service providers in accordance with the requirements specified by licensing authority. SRs shall be formulated, revised, or withdrawn in the same manner as detailed for GRs/IRs. However, DCC for this purpose, shall have members only from Licensing Branch of DoT and from TEC. Accordingly, DFC shall be circulated amongst these members only.

3.4.2 SR shall have same format as that of GR as applicable to the particular service. TEC shall concurrently create Test Schedules and Test Procedures for every SR also, in order to test and validate networks and services.

3.4.3 SR NUMBERING

3.4.3.1 SRs shall be assigned specific numbers for ease of identification, as follows

No: TEC/SR/BBB–xxx/vv/MMM-YY
TEC: Telecommunication Engineering Centre
SR: Service Requirements
BBB: Service name (alphabets)
xxx: Service reference (alpha-numeric value)
vv: Version reference (numeric value)
MMM: Month in which SR is released
YY: Year in which SR is released

3.5 QUALITY REQUIREMENTS

No: TEC/QLY/BBB–xxx/vv/MMM-YY

3.6 EMI/EMC REQUIREMENTS

No: TEC/EMI/BBB–xxx/vv/MMM-YY

3.7 SAFETY REQUIREMENTS

No: TEC/SAF/BBB–xxx/vv/MMM-YY

3.8 SECURITY REQUIREMENTS

No: TEC/SEC/BBB–xxx/vv/MMM-YY

3.9 TSTP

3.9.1 Conformance to a particular GR, IR, or SR require, testing and measurements. Procedures for establishing such conformance, associated with respective GR, IR, or SR shall be contained in Test Schedule and Test Procedure.

3.9.2 Numbering scheme for different TSTPs shall be as following

No: TEC/TSTP/GR/AA/BBB–xxx/vv/MMM-YY
No: TEC/TSTP/IR/BBB–xxx/vv/MMM-YY
No: TEC/TSTP/SR/BBB–xxx/vv/MMM-YY
No: TEC/TSTP/QLY/BBB–xxx/vv/MMM-YY
No: TEC/TSTP/EMI/BBB–xxx/vv/MMM-YY
No: TEC/TSTP/SAF/BBB–xxx/vv/MMM-YY
No: TEC/TSTP/SEC/BBB–xxx/vv/MMM-YY

4.0 GROUPS, COMMITTEES AND FORUM

4.1 GR/IR/SR formulation mechanism envisages involvement of five major groups, committees, and forum, viz.,
a. Development Coordination Committee (DCC)

- b. DCC Sub-Committee
- c. Draft For Comments (DFC) Group
- d. Manufacturers' Forum (MF)
- e. Core Groups

4.2 DEVELOPMENT COORDINATION COMMITTEE (DCC)

- 4.2.1 DCC shall be the apex body constituted by Sr. DDG, TEC, which shall consist of industry representatives drawn from different Service Providers and Associations. Separate DCC shall be constituted for each of the aforesaid disciplines. Being a technical body, special effort would be needed to identify appropriate experts in industry for nomination to DCC. DCC shall be the final body for recommending GR/IR/SR for approval of Sr. DDG, TEC.
- 4.2.2 Technical subjects dealt by TEC are sub-divided into six broad disciplines
- a. Switching (Core Networks, Interoperability between networks Associated Services & Applications)
 - b. Transmission (Optical, Radio, Satellite transport for Core, Edge and Access)
 - c. Customer Networks (Access and Terminals)
 - d. Information Technology (LAN, WAN, Routers, Switches, IP TV, etc.)
 - e. Wireless Systems (GSM, CDMA, WiMAX, WiFi, Spectrum, etc.)
 - f. Passive Infrastructure (Cable, Power Plant, Towers, Antennas)
- 4.2.3 A DCC member shall ordinarily be from the top management of an organization capable of articulating the vision, plan and objective of his/her organization.
- 4.2.4 Each DCC shall have a nominated DDG of TEC as its Convener. Any DCC may have more than one DDG as member depending upon the subjects dealt with. Steering of specific subjects within a discipline shall be carried out by the concerned DDG. For inter-disciplinary co-ordination, the convener of a DCC may invite any other DDG to attend any of the scheduled meetings. He may also depend upon certain special invitees to provide expert advice or engage in any of the debates.
- 4.2.5 Experts from users/service providers shall also be nominated, by name, by Sr. DDG, TEC, on a yearly basis. An expert cannot nominate an alternate member.
- 4.2.6 DCC may be reconstituted at any time by Sr. DDG, TEC, if found necessary.

4.3 DCC SUB-COMMITTEE

- 4.3.1 Each DCC shall have a DCC Sub-committee for dealing with specific subjects and creating draft documents. DCC Sub-Committee shall be a group of working-level experts drawn from service-providers, associations, and Director level officers of DoT/TEC. Each DCC member shall nominate a member for DCC Sub-Committee. Any other known experts can also be nominated in the Sub-committee. Concerned DDG shall approve the formation of DCC Sub-Committee.
- 4.3.2 DCC Sub-Committee shall discuss TEC draft and carry out necessary modifications to evolve DFC documents. Wherever required, interdisciplinary Groups of TEC may be included or consulted. Director of the TEC Core Group shall be the Convener and shall steer the proceedings of the sub-committee.

4.3.3 DCC Sub-committee shall create draft documents in line with the vision and direction provided by the DCC.

4.4 DRAFT FOR COMMENTS (DFC) GROUP

4.4.1 DFC Group consists of experts for a particular family of network elements from R&D institutions, academic institutions, user organizations, service providers, etc.

4.4.2 Sr. DDG, TEC, shall approve the DFC Group constituted by respective DDsG.

4.5 MANUFACTURERS' FORUM

4.5.1 Manufacturers' Forum shall be a group of technical representatives of manufacturers, suppliers, representatives of a network element or a group of network elements, and concerned members of Telecom Equipment Manufacturer's Association (TEMA), and other associations, etc.

4.5.2 Manufacturers' Forum shall be constituted for a specific network element (e.g., modem, router) or a system comprising interconnected network elements (e.g., WiMAX System, or GPON System), as per the requirement.

4.5.3 The forum shall be constituted and modified from time to time by the concerned DDG of the core group who shall also be the Convener of the concerned forum.

5.0 FUNCTIONS OF GROUPS, COMMITTEES AND FORUM

5.1 DCC

5.1.1 DCCs shall be responsible for recommending formulation of a new GR/IR/SR. They may also recommend review or withdrawal of any GR/IR/SR. Being an Apex body, DCCs shall provide vision for future network elements or technologies and provide necessary guidance to its respective DCC Sub-Committee which engages in technical deliberations and helps in preparation of documents. DCCs may also initiate work on national level plans and give their recommendations to TEC.

5.2 DCC SUB-COMMITTEE

5.2.1 DCC Sub-Committee shall be responsible to work on draft document in the prescribed manner. It shall carry out modifications in TEC Drafts, prepare Liaison Statements with respect to inter-division comments, review GRs/IRs/SRs and DFCs, and submit the documents to the DCC for its consideration.

5.2.2 Liaison Statements shall be replied in one sitting itself.

5.3 MANUFACTURER'S FORUM (MF)

5.3.1 MF shall be responsible for furnishing relevant technical information for the concerned equipment.

6.0 DOCUMENT FORMULATION PROCESS

6.1 FORMULATION PROCEDURE

6.1.1 Formulation of GR/IR/SR shall broadly follow the following procedure.

Stage	Activity
TEC Draft	Study and consultations Comments from DCC Sub-Committee members and Manufacturers Discussions in DCC Sub-Committee Meeting
DFC	Comments from DFC members Discussions in DCC Sub-Committee with comments
Pre-DCC Draft	Comments from Manufacturers Discussions in Manufacturers' Forum Meeting Comments from other DDsG Discussions in DCC Meeting
Draft GR/IR/SR	Formulation of Provisional Test Schedule and Test Procedure Approval of Sr. DDG, TEC
GR/IR/SR	Notification through TEC website Fist testing of network element or system
TSTP	

6.2 INITIATION FOR FRAMING GR/IR/SR

- 6.2.1 Framing of any new GR/IR/SR can be initiated after receiving a request from any of following
- Department of Telecommunication (DoT)
 - Telecom Service Providers
 - User groups
 - Members of DCC
- 6.2.2 Manufacturers can initiate a requirement for new technology by referring to TEC. TEC can suo-moto decide to frame specifications based on worldwide developments and trends in telecommunications. Framing and approval of a GR/IR/SR shall be done with the approval of Sr. DDG, TEC.

6.3 WORKING OF CORE GROUP

- 6.3.1 Generic Requirements are framed for each identified network element or network element family. Concerned Core group in TEC shall prepare an initial draft, based on the vision and direction provided by the DCC, after detailed study on the subject, consulting relevant journals, reports, recommendations and standards issued by Standards Bodies, such as ITU, ETSI, Bell Core, IEEE, FCC, CISPR, VDE, IEC, International Forums, etc., including inputs from service providers, other users of telecom equipment and services, manufacturers, presentations by

manufacturers, attending of seminars, and discussions with various experts, etc.. This document shall be called TEC draft.

- 6.3.2 TEC draft shall be circulated to all members of DCC Sub-Committee and Manufacturers' Forum to obtain their comments.

6.4 WORKING OF DCC SUB-COMMITTEE

- 6.4.1 Meetings of DCC Sub-Committee shall take place monthly, unless there are no pending Liaison Statements or documents to be prepared. Meeting can be convened earlier also, if required.
- 6.4.2 All necessary documents shall be sent to all members, at least 15 days before the date of meeting.
- 6.4.3 Minor modifications to clauses of existing document that may require urgent disposal shall also be circulated at least 7 days before the meeting.
- 6.4.4 In every meeting all TEC Drafts, along with other associated information (such as comments of MF and DFC Group), shall be discussed.
- 6.4.5 Member or an alternate member, present in a meeting, shall represent his/her organization, and his/her opinion shall be treated as final as of his/her organization.
- 6.4.6 All members are expected to come prepared for meetings. They are also expected to send their comments on the document, well in advance to help arrive at conclusions in the meeting.
- 6.4.7 Convener of the meeting shall put up the minutes of the meeting, along with DFC, to the concerned DDG.
- 6.4.8 Comments of DFC Group and Manufacturers' Forum on DFC shall finally be compiled in the Pre-DCC draft for final approval.
- 6.4.9 Any specific issues requiring interaction with or seeking clarifications or guidance from other DCC Sub-Committees shall be sent as Liaison Statements to other DCC Sub-Committees. If required, a representative may attend concerned DCC Sub-Committee's next meeting to present the Liaison Statement. Liaison Statements shall always be the first documents to be taken up by any DCC Sub-Committee in its next meeting.

6.5 WORKING OF DRAFT FOR COMMENTS (DFC) GROUP

- 6.5.1 All DFC document shall be sent to the members for their comments.
- 6.5.2 It is expected that all the members shall send the comments within 15 days.
- 6.5.3 Comments received shall also be incorporated in DFC and the document so evolved shall be called Pre-DCC draft.

6.6 WORKING OF MANUFACTURER'S FORUM

- 6.6.1 Meetings of Manufacturers' Forum shall be convened whenever new specifications are to be formulated or existing specifications are to be revised.
- 6.6.2 DFC shall be sent to all members either directly and/or through their associations, as well as to all members of DCC and DCC Sub-committee, at least 2 weeks before meeting. Manufacturers' Forum shall be convened at least 3 weeks before DCC meeting.
- 6.6.3 In every meeting all DFCs, along with other associated information, shall be discussed.
- 6.6.4 Member or an alternate member, present in a meeting, shall represent his/her organization, and his/her opinion shall be treated as final as of his/her organization.
- 6.6.5 All members are expected to come prepared for meetings. They are also expected to send their comments on the document, well in advance to help arrive at conclusions in the meeting.
- 6.6.6 Convener of the Forum shall compile the comments of members and put them up to the DCC.
- 6.6.7 All meeting notices of the Manufacturers' Forum shall also be sent to DCC and DCC Sub-committee members so that they may be able to participate if required.
- 6.6.8 If required, a combined meeting of the DCC Sub-committee and Manufacturers' Forum shall be convened.

6.7 WORKING OF DCC

- 6.7.1 Meetings of DCC shall take place quarterly. Meeting can be convened earlier also, if required.
- 6.7.2 Pre-DCC Drafts, along with comments from Manufacturers' Forum, and of DDsG of TEC, shall be sent to all members, at least 15 days before the date of meeting.
- 6.7.3 Minor modifications to clauses of existing document that may require urgent disposal shall also be circulated at least 7 days before the meeting.
- 6.7.4 In every meeting all cases of GRs/IRs/SRs including Pre-DCC Drafts along with other associated information (such as comments of MF and DFC Group) shall be discussed.
- 6.7.5 Member or an alternate member, present in a meeting, shall represent his/her organization, and his/her opinion shall be treated as final as of his/her organization.
- 6.7.6 All members are expected to come prepared for meetings. They are also expected to send their comments on the document, well in advance to help arrive at conclusions in the meeting.

- 6.7.7 DCC shall approve the document with modifications, if any, in a maximum of two meetings. The document, so formulated, shall be called Draft GR/IR/SR.
- 6.7.8 Convener of DCC shall issue the minutes of DCC meetings, including additional comments (if any) of the members, within 15 days of the meeting.
- 6.7.9 Draft GR/IR/SR, along with minutes of DCC meeting, shall be put up to Sr. DDG, TEC, for approval.
- 6.7.10 After approval of the draft by Sr. DDG, TEC, the final document shall be referred to as GR/IR/SR.

6.8 FORMULATION OF TSTP

- 6.8.1 Respective Core Groups in TEC shall prepare Draft Test Schedule and Test Procedure (TSTP) for Type Approval, covering all the parameters of GR/IR/SR. In this process manufacturers shall also be consulted.
- 6.8.2 Draft TSTP shall be put up to Sr. DDG, TEC, for approval, after which it shall be referred to as Provisional TSTP.
- 6.8.3 The procedure and tests shall be validated through first testing of a relevant network element or a system. After carrying out modifications, if required, the Provisional TSTP shall be finalised.

6.9 TIME SCHEDULE

- 6.9.1 A new GR/IR/SR would normally be finalised within six months from the date of preparation of TEC draft.

6.10 PROCEEDINGS OF MEETINGS

- 6.10.1 Maximum use of electronic mode of transfer of documents, comments, etc., shall be relied on. All notices for meetings, relevant documents, and communications shall be sent electronically to all the members. All members are also expected to send their comments electronically.
- 6.10.2 Members may exchange/discuss documents before sending their comments to committees.
- 6.10.3 All relevant documents, minutes of meetings, correspondences, and information, shall also be available on the website of TEC
- 6.10.4 All the recommendations of the committees, forums, and groups shall be finalised through consensus, as far as possible, rather than through taking votes, to ensure safeguarding interests of all the stakeholders.
- 6.10.5 In all matters arising out of the Committee work, the convener shall be the official spokesman for the respective committee.
- 6.10.6 It is desired that the discussions during the meetings and their records are treated confidential by all the members as well as by the participating organizations.

Opinions expressed during the meetings, including supportive data, shall be accepted in good faith by TEC, and shall be kept confidential.

6.10.7 Framework for formulation of documents shall be sufficiently flexible to cover all stakeholders, viz., service providers, manufacturers, developers, vendors, etc.

6.10.8 All expenses incurred by nominees for participating in various proceedings and interactions, shall be borne by participating organizations.

6.11 MODIFICATIONS TO GR/IR/SR DOCUMENT

Any modification to a document can be taken up based on first equipment testing, field trial, or feedback received from service providers/user organizations. Comments from DCC members shall be obtained either in a meeting or through circulation. Modifications to GR/IR/SR shall be approved by Sr. DDG, TEC, as Amendments to GR/IR/SR.

6.12 WITHDRAWAL OF GR/IR/SR

There may be need to withdraw a document due to supersession by a new document, technology obsolescence, equipment not in use, or any other reason. On the advice of service provider(s), any member of DCC, DoT, or TEC, GR/IR/SR shall be discussed in DCC. It shall be withdrawn after recommendation of DCC and approval of Sr. DDG, TEC.

6.13 REVIEW OF GR/IR/SR

Review of a document will be taken up normally every three years. A document can be reviewed earlier also due to advancement in technology, service providers'/user organizations' inputs, or on advice of DoT. TEC can suo-moto take-up review of documents based on worldwide developments and trends in telecommunications. Review of a document shall follow same steps as outlined for framing of a document.

7.0 Existing GR/IR

The existing GRs/IRs/SRs shall remain in force till these are reframed in the new format as given in this document. Existing GRs/IRs/SRs may be reviewed on specific request of service provider or manufacturer/vendor.