

REPUBLIC OF THE UNION OF MYANMAR  
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS  
POSTS AND TELECOMMUNICATIONS DEPARTMENT

**TECHNICAL SPECIFICATION  
AND  
QUALITY OF SERVICE  
FOR  
INTERNATIONAL GATEWAY SERVICE**

**5<sup>th</sup> April 2017**

## Table of Contents

|    |                                               |    |
|----|-----------------------------------------------|----|
| 1  | ABBREVIATIONS AND ACRONYMS .....              | 2  |
| 2  | DISCLAIMER .....                              | 2  |
| 3  | INTRODUCTION .....                            | 3  |
| 4  | GENERAL CONDITIONS.....                       | 3  |
| 5  | SYSTEMS, CONNECTIVITY AND REDUNDANCY.....     | 3  |
| 6  | LAWFUL INTERCEPTION.....                      | 4  |
| 7  | OTHERS .....                                  | 5  |
|    | INTERNATIONAL DATA TRAFFIC.....               | 5  |
| 1  | SYSTEMS AND CAPACITY REQUIREMENTS.....        | 5  |
| 2  | ROUTING .....                                 | 6  |
| 3  | QUALITY OF SERVICE.....                       | 6  |
| 4  | REPORTING REQUIREMENTS .....                  | 7  |
| 5  | MONITORING REQUIREMENTS .....                 | 7  |
|    | INTERNATIONAL VOICE TRAFFIC.....              | 7  |
| 1  | SYSTEMS AND CAPACITY REQUIREMENTS.....        | 7  |
| 2  | INTERFACE REQUIREMENTS .....                  | 8  |
| 3  | SIGNALING/PROTOCOL .....                      | 8  |
| 4  | QUALITY OF SERVICE .....                      | 8  |
| 5  | ECHO CANCELLATION.....                        | 9  |
| 6  | SPEECH CODING .....                           | 9  |
| 7  | TIME SYNCHRONIZATION AND CLOCK ACCURACY ..... | 9  |
| 8  | NETWORK SECURITY .....                        | 9  |
| 9  | SUPPORT ENUM SERVICES (OPTIONAL) .....        | 9  |
| 10 | CALL DETAIL RECORD .....                      | 9  |
| 11 | REPORTING REQUIREMENTS .....                  | 10 |
| 12 | CDR DATA PROTECTION.....                      | 10 |
| 13 | REJECTION OF INCOMING CALLS .....             | 11 |
| 14 | TRANSIT CALLS.....                            | 11 |
| 15 | PERFORMANCE MONITORING BY PTD .....           | 11 |

# 1 ABBREVIATIONS AND ACRONYMS

- 1.01 ANS - Access Network Services.
- 1.02 ASCII - American Standard Code for Instruction Interchange
- 1.03 BGP - Border Gateway Protocol
- 1.04 BHCA - Busy Hour Call Attempts
- 1.05 BNS - Backbone Network Service.
- 1.06 CALEA - The Communication Assistance for Law Enforcement Act (US)
- 1.07 CDR - Call Detail Record.
- 1.08 CCS7 - Common Channel Signaling No. 7
- 1.09 DDF - Digital Distribution Frame
- 1.10 ENUM - eTelephoneNumber Mapping.
- 1.11 ETSI-ES - European Telecommunications Standard Institute- European Standard
- 1.12 ETSI TS - European Telecommunications Standard Institute- Technical Standard
- 1.13 IEC - International Electro technical Commission
- 1.14 IETF - Internet Engineering Task Force
- 1.15 IGW - International Gateways.
- 1.16 IP - Internet Protocol.
- 1.17 IPLC - International Private Leased Circuit.
- 1.18 ISO - International Organization for Standardization
- 1.19 ISP - Internet Service Provider.
- 1.20 IX - Internet Exchange.
- 1.21 LEA - Law Enforcing Agencies
- 1.22 LI - Lawful Interception.
- 1.23 MRTG - Multi Router Traffic Graper.
- 1.24 NGN - Next Generation Network.
- 1.25 POP - Point of Presence.
- 1.26 POI - Point of Interconnection.
- 1.27 PLMN - Public Land Mobile Network.
- 1.28 PSTN - Public Switched Telephone Network.
- 1.29 PTD - Posts and Telecommunications Department
- 1.30 QoS - Quality of Service.
- 1.31 SIP - Session Initiation Protocol.
- 1.32 SLA - Service Level Agreement
- 1.33 STM-x- Synchronous Transfer Mode (Fiber Channel Card)
- 1.34 VoIP - Voice over Internet Protocol.
- 1.35 VPN - Virtual Private Network.
- 1.36 VSAT - Very Small Aperture Terminal.

# 2 DISCLAIMER

The following is the Technical Requirements and QoS document for International Gateways' (IGW). This document is being prepared in consultation with IGW operators and applicants and the document has been arranged in view with international best practices, ITU recommendations. The following may be modified as required by Posts and Telecommunications Department, hereon PTD.

### **3 INTRODUCTION**

The IGW Service provider shall establish, operate and maintain the International voice and/or International data traffic. All Voice and Data traffic will be routed (terminating to and originating from Myanmar) through International Gateways (IGWs).

The authorized entity will have primary backbone connection towards International network through best suited connectivity mechanism (submarine, terrestrial, VSAT etc.) and PTD encourages that the redundancy is maintained via alternative of the primary connection (i.e. if primary is terrestrial then alternative can be submarine etc.).

### **4 GENERAL CONDITIONS**

This document shall be read in tandem to the "Guidelines on Provision of International Gateway Services" issued by Posts and Telecommunications Department, Ministry of Transport and Communications, Republic of the Union of Myanmar on The 7th waxing day of Tawthalin 1378 ME (8th September 2016).

The following conditions shall be considered as general condition, applicable to all IGW service providers.

- 4.01 The IGWs will provide international voice call services in both clear channel and VoIP, origination and routing facilities to the relevant parties, where applicable.
- 4.02 PTD encourages self-monitoring by the IGWs; The IGWs shall be required to provide information on Systems, Services and Finance periodically (quarterly) or at any time if asked for by the Department.
- 4.03 PTD may direct to balance the flow of international traffic in necessary.
- 4.04 PTD may determine "floor price" for international voice traffic terminating to Myanmar if necessary.
- 4.05 The IGW shall comply with any additional technical specifications prescribed by PTD for the purposes of ensuring technical compatibility, avoiding interference with existing telecommunications network and/or systems, operating at minimal power consumption and minimizing environmental impact.
- 4.06 The IGW operators are encouraged towards infrastructure sharing with appropriate permission from PTD (see Section 33, Guidelines on Provision of International Gateway Services)
- 4.07 The existing IGW operators shall ensure full compliance to the guideline by 1<sup>st</sup> January 2018.
- 4.08 PTD reserves the right to modify the above requirements as and when felt necessary in discussion with the Gateway Operators.

### **5 SYSTEMS, CONNECTIVITY AND REDUNDANCY**

The Gateway Router shall have but not limited to Packet over SDH (POS) and Gigabit Ethernet (GE)/Fast Ethernet (FE). It shall support different interface speeds such as but not limited to, STM-1, STM-4, STM-16, STM-64, GE, FE and etc.

- 5.01 IGWs must plan geographical redundancy, best suited for operation and redundancy within two years of operations.
- 5.02 All the critical equipment should be fully redundant (1+1) to avoid any single point of failure.
- 5.03 IGWs shall have primary connectivity with overseas voice carriers/IP bandwidth providers through terrestrial/Submarine Cable/VSAT.
  - 5.03.1 The IGW shall build or lease capacity from terrestrial/Submarine Cable/VSAT Operator and will have to connect with overseas carriers at their own arrangement.
- 5.04 The IGW shall arrange to reach the domestic PoPs of terrestrial/submarine cable with suitable transmission media. Locations of PoPs has to be approved by PTD(within 7 days).
- 5.05 IGW will arrange back up connectivity through terrestrial/submarine cable/VSAT. This backup connectivity should have the capability to cater minimum 25% of the total bandwidth carried through primary connectivity.
- 5.06 In order to ensure service during an outage or to create redundancy, an IGW provider may interconnect with another IGW provider.
  - 5.06.1 Arrangements among national IGWs shall also be considered as fulfilling redundancy requirement
- 5.07 However depending upon the SLA with local ANS/other Licensees, IGW will arrange additional capacity. This requirement may be achieved through interconnection and capacity sharing among national IGWs.
- 5.08 The IGWs will have to provide physical connections with relevant parties. The connectivity and related expenses will be borne by other parties unless mutually agreed otherwise.
  - 5.08.1 In the case for a Domestic Internet Exchange (IX), IGW shall have to connect with the IX and shall have to bear to expense.
- 5.09 In case of any Interfacing problem, the IGW who comes later would be responsible to solve the problem regarding interconnection. For any dispute between the parties, the decision of the PTD shall be final and binding upon all the parties.
- 5.10 All domestic VSAT Hubs will also be connected through appropriate interfaces. The IGW shall arrange to reach the domestic POPs of terrestrial/submarine cable with suitable transmission media with appropriate interface.

## 6 LAWFUL INTERCEPTION

The IGW shall make its systems ready to and for the Lawful Interception (LI).

- 6.01 The IGW shall be compliant ETSI ES 201 671 v.3.1.1. and TS 101.671 V3.12.1 or above
- 6.02 Redundant access points of Lawful Interception system shall have to be provisioned including transmission media, other necessary hardware and software for on-line and off-line monitoring, analysis of contents etc.

### **International Data Traffic**

- 6.03 The system shall be capable of sorting and sending data contents as required (but not limited to);
  - 6.03.1 Source IP address & Destination IP address (mandatory)
  - 6.03.2 Type of application (mandatory)
  - 6.03.3 E-mail address (optional)
  - 6.03.4 Web address (optional)
  - 6.03.5 Catchy words in e-mail, ftp, chatting (optional)

### **International Voice Traffic**

- 6.04 IGW shall ensure high capacity storage media, to store bulk CDR.
- 6.05 IGW shall provide for on-line listening of Call Content (CC) as per ETSI standards and as advised by the law enforcement agencies (LEA). IGWs shall be required to store the CDRs and Meta Data of all user traffic.
- 6.06 Duration of CDR and CC storage shall be decided by PTD and Government (6months).

## **7 OTHERS**

- 7.01 The IGW will have SLAs with all ISPs/licensees.
- 7.02 The IGW will ensure sufficient backup power to ensure uptime on 24/7 basis.
- 7.03 The IGW should provide 24/7 Network Operation Center (NOC) support.

**This draft document outlines the technical requirements and QOS guideline for Data and Voice traffic separately for simplicity.**

## **INTERNATIONAL DATA TRAFFIC**

The IGW provider shall establish, operate and maintain the international voice and international data traffic. All Voice and Data traffic will be routed (terminating to and originating from Myanmar) through International Gateways (IGWs).

The IGW shall consist of carrier-grade data communication equipment. The gateway router should be capable of handling high-speed Internet connection peering with multiple international Service providers.

## **1 SYSTEMS AND CAPACITY REQUIREMENTS**

- 1.01 The IGW must have initial capacity to connect several ISPs/carriers/exchanges and shall have provision to enhance capacity as required.
- 1.02 The Switching capacity shall not be less than 100 Gbps full duplex (200 Gbps half duplex).
- 1.03 The Gateway Router shall support the minimum forwarding rate of 160 million packets per second.
  - 1.03.1 The Gateway Router shall forward the packet on Line-rate on all the interfaces.
  - 1.03.2 The Gateway Router shall be equipped with adequate memory and processor capacity to maintain full BGP route with multiple Service providers and to ensure full load real time packet forwarding.
  - 1.03.3 The Gateway Router shall support 'wire-speed packet forwarding' for all packet sizes across all interfaces simultaneously.
- 1.04 The IGW shall provide Optical Distribution Frames (ODFs) with FE, GE, POS interfaces to connect ISPs. ODFs with necessary capacity will be installed by the IGW at its POPs, and/or interconnection points, where all the ISPs will come at their own cost.

- 1.05 The system must be equipped with adequate facilities to detect any voice traffic passing through IGW without a valid transit agreement with a licensed service provider and prevent any commercial or unauthorized traffic, where technically feasible. (also refer, Guidelines on Provision of International Gateway Services, Subject Technical Bypass Section 39, 40, 41, 42, 43, 44)
- 1.06 The required international bandwidth of the connected individual ISP/Carriers has to be ensured by the IGW service provider.
- 1.07 Based on demand forecast IGW will arrange for equipment and transmission capacity expansion on 3 months lead time basis.

## 1 ROUTING

The routing features shall have capacity to include the following, but not limited to:

- 2.01 Static Routing
- 2.02 Latest version of BGP
- 2.03 OSPF
- 2.04 RIPv2
- 2.05 IS-IS
- 2.06 MPLS
- 2.07 VRF with Multi-protocol BGP
- 2.08 IGMP
- 2.09 ICMP
- 2.10 RSVP

## 3 QUALITY OF SERVICE

An essential feature for Gateway Router is to support differentiated Quality of Service (QoS) for IP packets. To allow service providers to offer differentiated IP service plans to their subscribers, the Gateway Router must be able to deliver the following IP QoS:

- 3.01 IGWs shall ensure 99.995% (or 26 mins of outage per year) service availability
- 3.02 Roundtrip delay with any provider should be

|                                                                                                 |           |
|-------------------------------------------------------------------------------------------------|-----------|
| User reference point at POP/ISP Gateway Node to International Gateway                           | <120 msec |
| User reference point at ISP Gateway Node to International nearest NAP port abroad (Terrestrial) | <250 msec |
| User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)   | <800 msec |

\*msec = Millisecond

- 3.03 The IGW shall support simple traffic classifications (DSCP or TOS bits), traffic policing & shaping. IGW should ensure that all packets are forwarded according to their marked QoS

- 3.04 IGW shall support SLA probes to monitor the packet loss, jitter, latency parameters with peering ISPs and also the downstream service providers and corporate customers. The frequency of collecting probes should be configurable.
- 3.05 The systems should be ready not only for IPv4 but also for IPv6.

## **4 REPORTING REQUIREMENTS**

The Licensee may have to provide information on Systems, Services and Finance periodically or at any time if asked for by the Department. The requirement of data could be but not limited to as follows:

- 4.01 Five minute average Incoming and outgoing traffic for each international backbone link.
- 4.02 Maximum Incoming and outgoing traffic (5 minutes interval) for each international backbone link.
- 4.03 Application-wise traffic distribution (in percentage of total utilization) for each international backbone link.
- 4.04 All or any of the above report for any customer (i.e. ISP link) as requested by the PTD.
- 4.05 Any other as and when asked by the Department.

## **5 MONITORING REQUIREMENTS**

Following monitoring facilities must be made available:

- 5.01 Traffic status including incoming/outgoing traffic, packet drop and other performance indexes of each international link.
- 5.02 Provide facility to subscribers (corporate or ISP subscribers) to monitor his/her bandwidth utilization, packet drop and performance indexes.

## **INTERNATIONAL VOICE TRAFFIC**

The IGW provider shall establish, operate and maintain the international voice and international data traffic. All Voice and Data traffic will be routed (terminating to and originating from Myanmar) through International Gateways (IGWs).

## **1 SYSTEMS AND CAPACITY REQUIREMENTS**

- 1.01 The IGWs must have packet switching technologies with NGN/IMS functionalities. The IGWs can also have Circuit Switching capacity. These two types of switching technologies may be combined in a single system or in separate systems located in the same premise.
- 1.02 Each IGW must have sufficient initial capacity to handle concurrent calls and shall have sufficient BHCA (Busy Hour Call Attempts) capacity considering standard acceptable grade of service, average call holding time etc.
- 1.03 Based on traffic growth, IGWs will arrange capacity expansion on 3 months lead time basis.

- 1.04 IGW Service Providers must arrange for all technical and operational facilities to fulfill SLA (Service Level Agreement) with customers.

## 2 INTERFACE REQUIREMENTS

### International Side:

- 2.01 Both TDM and IP interfaces should be there at international side. The connectivity can be but not limited to at STM-4, STM-16, STM-64, GE and FE etc. level with terrestrial/submarine cable or any other level subject to availability of the submarine cable system(s) from authorized operator(s).
- 2.02 For interface requirement, the IGW will arrange with terrestrial/Submarine Cable operator and overseas carrier.

### National side:

- 2.03 At National side to connect with the customers, the interface will be in but not limited to STM-4, STM-16, STM-64, GE and FE level as available with customers. Any new interface in this respect may be installed subject to permission of the PTD.

## 3 SIGNALING/PROTOCOL

- 3.01 The CCS7 Signaling shall be used based on recent ITU-T recommendation or appropriate version. Moreover, it shall be backward compatible with other variants prevailing in Myanmar.
- 3.02 On International side, in addition to CCS7, all standard NGN signaling protocol recommended by ITU-T and IETF shall be available. However, IGW is solely responsible for inter-working with overseas operators.
- 3.03 The NGN equipment must support not only for IPv4 but also IPv6.

## 4 QUALITY OF SERVICE

The IGWs shall comply with all QoS standards imposed by PTD. PTD reserves the right to modify the QoS objectives from time to time.

- 4.01 IGWs shall ensure 99.995% service availability.
- 4.02 The IGW shall be responsible for ensuring that voice passes through its network shall have minimum loss as per ITU-T Recommendation G.1071.

|                         |                           |                                 |
|-------------------------|---------------------------|---------------------------------|
| TDM-based voice service | QoS is Mean Opinion Score | $\geq 4.34$ or Rscale $\geq 90$ |
| IP-based voice service  | QoS is Mean Opinion Score | $\geq 4.03$ or Rscale $\geq 80$ |

- 4.03 Resolution time of IGW fault impacting traffic (except for outages) within 1 hour
- 4.04 Testing reports must be made available to PTD periodically (as fixed by PTD), showing that minimum QoS level is being met.
- 4.05 The IGWs shall maintain records that demonstrate the manner and extent to which the QoS standards have been complied with and shall furnish a certified copy of such

---

<sup>1</sup>ITU-T Rec. G.107 (03/2005) 13

records to PTD on monthly basis. PTD may publish such QoS statistics on a regular basis.

## **5 ECHO CANCELLATION**

- 5.01 The IGW shall adopt the echo cancellers for echo control of international circuits.
- 5.02 The echo cancellers shall contain the 'tone disable' function with either G.168/G.164.
- 5.03 The IGW shall ensure end-path delay up to 64ms and route specific settings of parameters such as delay etc.
- 5.04 In case of for packet-switching, appropriate echo cancellation mechanism shall be applied complying the ITU-T G.165/G.168 standards.

## **6 SPEECH CODING**

- 6.01 The coding of TDM voice channels shall be according to A-law as per ITU-T G.711/G.729.
- 6.02 The IGWs shall have standard ITU-T recommended coding techniques for the conversion of TDM voice to packet.

## **7 TIME SYNCHRONIZATION AND CLOCK ACCURACY**

- 7.01 IGWs shall have the capability to keep time synchronization with the Master Atomic Clock and with the other Network Time Protocol (NTP) server. IGW has to install NTP server.

## **8 NETWORK SECURITY**

- 8.01 For NGN, the IGW providers shall follow code of practice for information security as specified in as latest, ISO/IEC 27002.
- 8.02 To ensure security and ensure efficiency, IP addresses with MM suffix not registered in APNIC IPv4 and ASN shall have to be blocked.

## **9 SUPPORT ENUM SERVICES (optional)**

## **10 CALL DETAIL RECORD**

- 10.01 The IGWs must be capable of generating CDRs and recording detail data of all completed calls (both incoming and outgoing) for each of the circuit in any or all circuit groups. The following call-related data (not limited to) shall be generated and recorded in the system. The IGW have to take prior approval from PTD regarding the CDR format.
- 10.02 The CDR should contain at least, but not limited to, the following fields for outgoing and incoming calls.
  - 10.02.1 National Directory Number of the Calling Party;
  - 10.02.2 International Directory Number of the Called Party;
  - 10.02.3 Date and Time of the start of the call;
  - 10.02.4 Date and Time of the end of the call;
  - 10.02.5 Duration of the call;

- 10.02.6 Call Category (outgoing/incoming);
- 10.02.7 Outgoing Route Identifier (i.e., International side);
- 10.02.8 Incoming Route Identifier (i.e., National side)
- 10.02.9 Charging status of the call (Chargeable/Non-chargeable)
- 10.03 The initiation of charge shall start upon receipt of answer signal from the called subscriber and the charging shall stop when either party releases the call.
- 10.04 Activation of the CDR recording shall be by default for any circuit or circuit group. Without CDR any call must not be allowed.

## 11 REPORTING REQUIREMENTS

The Licensee shall also be required to provide any information on Systems, Services and Finance periodically or at any time if asked for by the Department. The requirement of data could be but not limited to as follows:

- 11.01 International Outgoing calls:
  - 11.01.1 total no. of calls and paid minutes
  - 11.01.2 Total no. of calls and paid minutes for each carrier for every destination
  - 11.01.3 Total no. of calls and paid minutes for each customers (i.e. ANS operators) for every destination
  - 11.01.4 Total no. of transit calls and paid minutes showing carrier, destination and origination (IGW, ANS)
- 11.02 International Incoming calls:
  - 11.02.1 Total no. of calls and paid minutes
  - 11.02.2 Total no. of calls and paid minutes for each carrier for every destination (i.e. ANS)
  - 11.02.3 Total no. of calls and paid minutes for each carrier for every origination
  - 11.02.4 Total no. of transit calls and paid minutes showing carrier and destination (IGW and ANS)
  - 11.02.5 International Transit Calls: For transiting international calls between two overseas carriers, the IGW shall follow PTD's reporting format.
  - 11.02.6 Testing reports for QoS shall be made available to the Department periodically, as fixed by the Department, showing that minimum QoS level is being met.

## 12 CDR DATA PROTECTION

- 12.01 There must be enough protection against erasure or corruption of CDR in case of system shutdown, power failure, electro-magnetic interference, electrical & lightning surges, fault conditions, illegal access and wrong commands or card insertion. The records shall also be protected against any change-over or reset due to fault in hard disks or by any manual or by software means
- 12.02 The IGWs must have log file facilities to record all types of system messages, fault and alarm messages, maintenance records etc. Records of all executed commands shall also be kept in log files and these files shall be stored in system hard disk. The logs must not be editable and must be on at all times. The system shall also provide the facility to dump this logs to maintenance terminals, on request and/ or automatically, and to

secondary memory devices for storage. Log files shall be stored to meet compliance and audit trailing.

### 13 REJECTION OF INCOMING CALLS

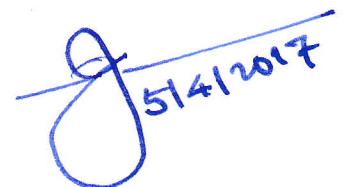
- 13.01 The IGWs shall have the capability to reject termination and/or block processing of incoming calls via any route as instructed by the Department by:
  - 13.02 Identifying the incoming route number
  - 13.03 Identifying the Number of the Calling party
  - 13.04 Identifying the called party number

### 14 TRANSIT CALLS

- 14.01 Prior approval of PTD would be required for international 'Transit Call Services' between two overseas carriers.
- 14.02 The IGWs shall have the capability to reject termination and/or block processing of transit calls via any route as instructed by the Department by:
  - 14.02.1 Identifying the called party number
  - 14.02.2 Identifying leading digits of the destination number
  - 14.02.3 Identifying the outgoing route number

### 15 PERFORMANCE MONITORING BY PTD

- 15.01 PTD may seek from the IGWs to observe traffic and performance related data on any or all of the individual trunk circuit groups/links from IGW. There shall be provision to record and print (if required) results of such observations after pre-set period.
  - 15.01.1 At least the following counters have to be provided. Traffic measurement time interval shall be ¼ hour, ½ Half hour, ¾ hour, 1 hour and daily basis.
- 15.02 The IGWs shall have provision for saving & printing of Traffic Data/Performance measurement data.



(Soe Thein)

Director General

Letter no: 500-SaNya-5/License/1903  
Dated: 5<sup>th</sup> April 2017