EXPRESSION OF INTEREST (EOI) FOR SELECTION OF TRIPLE PLAY CPE BOXES WITH WI-FI (INTERNET+IPTV+TELEPHONY), SINGLE IPTV BOX PROVIDERS AND OLT's FOR ANDHRA PRADESH FIBERNET LIMITED NO. APSFL/EOI/TP CPE/2023, DT: 16.03.2023

Andhra Pradesh FiberNet Limited A 3rd Floor, NTR Administrative Block, Pandit Nehru Bus Station, NH 65, Vijayawada-520001, Andhra Pradesh, India.

Andhra Pradesh State FiberNet Limited (APSFL Government of Andhra Pradesh invites Expression of Interest (EoI) for Selection of Suitable provider for Triple Play with Wi-Fi (Internet + IPTV + Telephony), Single IPTV CPE Boxes and OLT's.

1	EOI Number & Date	APSFL/EOI/TPCPE/2023, DT: 16.03.2023
2	EOI Document Availability	EOI document can be downloaded from website www.apsfl.in from date: onwards till last date of submission of the EOI.
3	Last date and time of submission of response to EOI	DT: 08.05.2023 and 4:00 PM
4	Address for Communication and submission of Bid	3rd Floor, NTR Administrative Block, APSFL corporate office, Vijayawada - 520010
5	Contact Person	V G Shashank Reddy AGM (OCC, IPTV & OTT), APSFL. Ph: 8790107108 Email: agm@apsfl.co.in
6	Any proposal received by Andhra Pradesh State Fibernet Limited after the deadline for of EOI will not be accepted.	
7	Andhra Pradesh State Fibernet Limited reserve the right to reject or accept or withdraw the EOI without assigning the reasons thereof.	
8	The sealed envelope containing the Proposal documents / the sealed box containing Triple play CPEs must be submitted at Andhra Pradesh State Fibernet Limited 3rd Floor, NTR Administrative Block, Pandit Nehru Bus Station, NH 65, Vijayawada-520001, Andhra Pradesh, India before closure of submission dated & time. The proposal may also be sent through post / speed post/Courier. A copy of the proposal shall also be emailed to agm@apsfl.co.in APSFL will not be responsible for any postal delay.	

Objective of the EOI:

Andhra Pradesh State FiberNet Limited intends to add another 15 Lakh Triple play homes through the AP Fiber Network, immediately, across the state. APSFL has finalized the standards & specifications for the Customer Premise Equipment (CPE) and Optical Line Terminal (OLT) to enable the intended services. APSFL through this EOI intends to empanel OEMs/Distributors of Triple play CPE who can support to deliver high Speed Internet along with existing IPTV / VAS services along with OTT & Telephony.

APSFL was incorporated to promote Digital inclusiveness and bridge urban-rural divide by providing affordable, high-speed broadband connectivity to households, deepening the reach of internet in the rural areas. Network infrastructure was laid out for providing triple play services (IPTV, Internet, Telephony) to households and Govt/Private Enterprises through IP MPLS (Internet Protocol Multi-Protocol Label Switching) & GPON (Gigabit Passive Optic Network) technologies

Scope of Work:

The Empanelled vendor shall be able to supply Triple play CPE with Wi-fi Single band/ Dual band for delivering Triple play services

Samples Testing within APSFL Network

The Vendor/OEM interested to empanel have to submit 5 Samples of Triple play CPE box for testing and the CPE has to comply for all the standards & specifications given in this EOI and any other compliance that are deemed necessary for delivery of quality services to the end users adhering to the SLA.

Empanelling Vendor/OEM shall submit at-least 5 nos. of samples of the entire kit (including but not limited to CPE box and other required accessories like interconnection cables) to APSFL, for testing, which will be tested in lab as well as on the field as per requirements by APSFL. The vendor needs to submit the test report of these samples provided along with the Proposal. In case bidder fails to submit the Prototypes on the request of APSFL (or) fails to submit successful test reports within the stipulated time, such Proposals will be rejected.

The empanelled Vendor/OEM shall ensure to meet the following during Sample testing / Acceptance Phase:

- The make/model of the CPE box is fully interoperable (full functionality) with existing APSFL Network, including and not limited to BSS, DRM, Middleware & OLT etc.
- The make/model of the CPE box should be fully interoperable with M/s Altice Labs (PTE) OLT, M/s Dasan OLT, M/s ZTE OLT and all other major OLT manufacturers.
- APSFL will provide the required details and approve the input devices. Empanelling vendors to note that the test lab is already ready and available for testing and certification of new CPE products.

Eligibility Criteria

Empanelling Vendor/OEM should

- Possess a turnover of at-least 250 crores for the last 5 years cumulatively.
- Shall possess all relevant certifications mandated by Govt of India/Govt of AP, as applicable from time to time, related to the product.
- Shall submit the experience of having delivered CPEs or having a manufacturing capacity of 1,00,000 CPEs per annum. Self-declaration of the same shall be provided by the vendor/OEM along with the proposal.

Non-fulfilment of the above said criteria shall result in rejection.

Schedule of Requirement:

S. No	Item description including Specification	UOM	Quantity (A)
1	**IP Set-top Box for gaining internet access**		Upto 500,000
2	**Combo Box for gaining access to internet**		Upto 10,00,000
3	**OLTs (4/8/16/32 port chassis) – Compatible with APSFL network and meeting requirements as specified in this tender.**	Ports	1 PON port per 100 CPEs/ Combo boxes supplied

Details of accessories are as follows

S. No	Description	Accessories
1	**IP Set-top Box for gaining internet access**	IR RCU, Power adapter with cable, HDMI connectors, 1.5M Lan CAT 6A Cable, required batteries for operation.
2	**Combo Box for gaining internet access with Accessories**	IR RCU, Power adapter with cable, HDMI connectors, 1.5M CAT 6ALan Cable, RJ 11 Port required batteries for operation.

Notes:

1. CPE boxes will be procured in an "either-or" model with preference for combo boxes subject to prices discovered in this EOI.
2. The minimum total requirement for CPE boxes shall be 1 million and can be increased up to 2million at APSFL's discretion within a period of two years

Technical Proposal

Combo Box for gaining internet access:

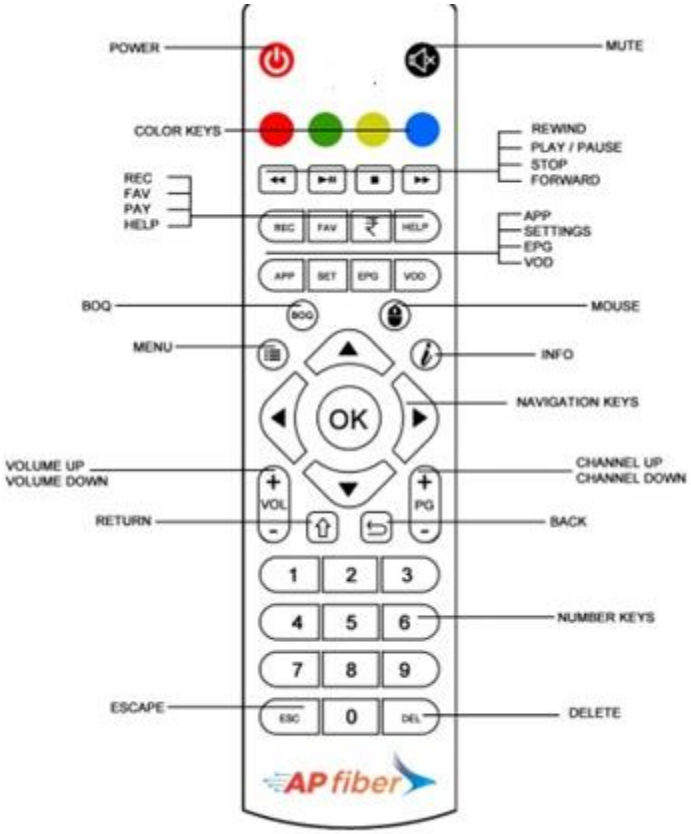
Hardware Specification	
OTT System	OS: Android 11 or above
	Processor: Quad Core ARM Cortex-A53 up to 2GHZ
	GPU: G31 supports Open GL ES 1.0/2.0/3.2, Vulkan 1.1 Open CL 2.0
	RAM: 2GB DDR3
	ROM: 16GB eMMC
Network (GPON)	WIFI: 2.4/5.0GHz, 802.11 a/b/g/n, 300Mbps
	Compliant with ITU-T G.984 GPON Standard
	Management: TR069 or SNMP
Connectors	RJ 45 (1GE and 1 FE), RJ 11, 1 FXS, HDMI 2.0, AV USB2.0 X2, TF card (optional)
Power Interface	DC IN

Other Interface	Front Panel / IR Receiver
Media	
Video	Decoder Supports video decoding upto 4k@60fps Supports Multiformats: - H.265 Main 10@L5.1 upto 4k@ 60fps - VP9 Profile 2 upto 4k@30fps - AVS2 JiZhun 10bit profile upto 4k@30fps - H.264 BP/MP/HP@L4.2 upto 4k@30fps - H.263 BP/ upto 1080p@60fps - MPEG-4 SP/ASP@L5 upto 1080p@60fps - MPEG-2 MP/HL upto 1080p@60fps - MPEG-1 MP/HL upto 1080p@60fps - xvid upto 1080p@60fps - Sorenson spark upto 1080p@60fps - VP8 upto 1080@60fps - AVS/AVS+ JiZhun profile upto 1080p@60fps - WMV9/Vc1 SP/MP/AP upto 1080p@60fps - JPEG HFIF file format upto 45 MPPS
Features	
4k	H.25 decoding upto 4Kx2K@60 fps, Support 4kx2k max resolution output
Network Streaming	HTML5, RTMP, HLS, Smooth Streaming
System upgrading	upgrading via USB disk or SD card, internet
Local Media	Video/Audio/Picture
External Storage	USB Storage, TF Card max upto128GB/250GB (FAT 32/NTFS)
Games	Android games
Other Parameters	
Input Voltage	DC 12V/1.0A
Power Consumption	10W Max
Operation Temperature	0 to approx. 40 degrees, Humidity <95%
Accessories	HDMI Cable: 1
	Power Adapter: 1
	IR Remote Control: 1
RCU	Remote control should have 0 to 9 number keys, channel +-, volume +-, volume mute button, 4navigation keys, ok button, 4 colour keys (Red, blue, green, yellow), Power of and Power on button, home button, back button, Apps button and hot keys to launch respective apps

Android IP STB for Gaining Internet Access:

OPERATION SYSTEM	Android 11 or above
Processor	Quad Core ARM Cortex-A35 equivalent or higher
GPU	ARM Mail-G31 MP2
RAM	2GB DDR3
ROM	16GB eMMC
Ethernet	Ethernet:10/100 standard RJ-45
Video Format Support	VP9-10 Profile-2 up to 4Kx2K@60fps H.265 HEVC MP-10@L5.1 up to 4Kx2K@60fps H.264 AVC HP@L5.1 up to 4Kx2K@30fps H.264 MVC up to 1080P @60fps Supports HDR10/HLG HDR processing(software upgrade require)
Media Format Support	Avi/Ts/Vob/Mkv/Mov/ISO/wmv/asf/flv/dat/mpg/mpeg
Audio Format Support	MP3/WMA/AAC/WAV/OGG/DDP/HD/FLAC/APE
Photo Format Support	HD JPEG/BMP/GIF/PNG/TIFF
HDR	HDR10 and HLG HDR ,Support the transformation between SDR and HDR
HDD File System	FAT16/FAT32/NTFS
Subtitle Support	SRT/SMI/SUB/SSA/IDX+USB
OSD Type of languages	English/French/German/Spanish/Italian/ etc multilateral languages
Mouse/Keyboard Support	Support mouse and keyboard via USB;Support 2.4GHz wireless mouse and keyboard via 2.4GHz USB dongle
3D	Hardware Graphics acceleration
AV	To be supported
HDMI	HDMI 2.0 up to 4k2k Output with HDR, CEC and HDMI 2.0a with HDCP 1.4b, 4Kx2K@30 max resolution output resolution output
I/O	RJ45:1
	DC-In:1
	USB 2.0/3.0:2
	HDMI:1 IR Receiver:1
	Optional Digital Audio:1
	Mirco SD Card Reader:1
Accessories	HDMI Cable: 1
	User Manual: 1
	5V/2A Adapter: 1
	Gift Box Packing: 1
	IR Remote Control: 1

IR Remote Specification



OLT Specifications:

4 Port OLT Specifications:

S.No	OLT – 4 Port Technical Specifications
1	**Generic Requirements**
	The FTTx solution should be based on GPON, XG-PON1 / Point-to-Point Active Ethernet.
2	**Service Interfaces**
	GPON, 2.5G downstream, 1.25G upstream.
	The equipment must be able to operate at the physical distance of 20 km and above (between OLT and ONU/ONT) without any additional amplification required.
	The OLT should support 1310 and 1490 nm wavelengths
	No. Of Subscribers per GPON port minimum is 128 (Splitting ratio 1:128)
	The system shall be support at least 2*GbE / 10xGbE network connections and should be pre-populated with 1 10G SFPs from day 1
	The FTTx platform shall be modular, with minimum of 40Gbps switching capacity.
	The Interfaces for the offered FTTx systems shall be of “plug in type (PIU) SFP modules”

	The offered OLTs/MDUs/HGWs shall be inter-operable with any third party ONTs as per the OMCI standards and must at least be certified by the Broadband Forum BBF.247. Inter-operability tests shall be done with different vendors
3	**Element management Requirements**
	Unified Element Management system (EMS) which can manage all the supplied OLTs & ONTs should be offered.
	The EMS should be able to work in cluster mode to scale easily for the management and monitoring requirements of the supplied OLTs and ONTs
	Network Management System for the offered equipment to provide the capabilities for configuration, operation, monitoring, remote monitoring, fault localization, and data storage.
	The management solution must support comprehensive service assurance functions including fault and performance monitoring
	The management solution should expose REST API for integration with other OSS/BSS applications
4	**FTTx SYSTEM GENERAL REQUIREMENTS**
	Compliant to the relevant ISO/ETSI industry quality standards (e.g. ISO 9000/9001), defining the quality system requirements for the design, development, production, delivery, installation and maintenance of product and services.
	The offered equipment shall be able to inter-work with the other user end equipment supplied by other vendors as per ITU-T specifications.
	The offered equipment shall support single fiber operation on standard SMF G.652, G.655 & G.657.
	The IGMP forwarding capabilities on OLT should be no less than 2000pps,
	The equipment shall support IPv4 and IPV6.
	The equipment shall support Multicast IPv4 & IPv6 and MLD Version1 & 2
	The equipment shall detect the optical power transmission of every ONT, once that it detects some problems in the status of the optical transmission power. The system shall disable the defective ONT automatically in order to guarantee the normally use of the others.
5	**The following VLAN Operations need to be supported:**
	Mapping of subscriber VLAN to a common service VLAN
	Translate/re-write subscribers VLAN ID to another VLAN ID
	VLAN switching
	Mapping of the subscriber traffic based on the IEEE 802.1p priority tagging to a specific VLAN.
	Mapping of the subscriber traffic based on the IEEE 802.1Q VLAN ID to a specific VLAN
	Mapping of the subscriber traffic based on the combination of IEEE 802.1p and 802.1Q tagging to a specific VLAN
6	**Subscriber Access methods supported**
	DHCP, DHCP option 82/60/43/37/18, Static IP, PPPoE
	Shall support multiple service delivery of data, voice, video, surveillance cameras and

	upstream multicast
	Shall support IP policing at the network and subscriber end.
	Shall support Ethernet 802.1p and IP TOS bit prioritization.
	The OLTs shall be able to support mobile traffic backhauling.
	Support for the Building Integrated Timing Supply (BITS), 10 MHz, 1 pulse per second (1PPS), and time of day (TOD) interfaces. supports synchronous Ethernet (SyncE) and IEEE-1588 functionalities and Shall act as the source for network clocking for TDM, SDH and SONET, SyncE, and GPS interfaces. In addition to the timing services
	The Equipment must support IP Multicasting to cater for interactive services such as broadcast IPTV, distance learning, etc.
	Static routing and Dynamic routing
7	**QoS Features supported**
	Trusted connectivity where the QoS setting / traffic prioritization configured by customer can be preserved.
	Un-trusted connectivity where the QoS setting / traffic prioritization configured by customer can be overwritten by the Equipment.
	The detail Downstream and Upstream QoS and traffic prioritization mechanism supported inclusive of the hardware queue available for each direction. A minimum of 8 hardware queues should be supported at both directions. The OLT should implement some queuing mechanism to manage the hardware queue such as SP, WRR, etc.
	Management System shall support bandwidth provisioning starting from 64 kbps granularity.
	Shall support Dynamic Bandwidth Allocation (DBA) mechanism to allow optimum bandwidth utilization on each PON interface. The detail implementation and capability of DBA mechanism should be explained in detail.
	Shall support basic OAM features such as loop back, remote diagnostic, CC and Link Trace complies with IEEE 802.1ag.
	Shall support port-mirroring function for trouble shooting, monitoring, and tracing purpose.
8	**ITU-T / IEEE RELATED SPECIFICATIONS**
	Shall comply to ITU-T/IEEE recommendations.
	ITU-T G.652: Characteristics of a single-mode optical fiber and cable.
	ITU-T G.757: Characteristics of a Bending Loss Insensitive Single Mode Optical Fiber and Cable for the Access Network
	ITU-T G.703: Physical/electrical characteristics of hierarchical digital interface.
	ITU-T G.704: Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 Kbit/s hierarchical levels.
	ITU-T G.984.1: GPON General Characteristics.
	ITU-T G.984.2: GPON Physical Media Dependent (PMD) layer specification.
	ITU-T G.984.3: GPON Transmission convergence layer specification.
	ITU-T G.984.4: GPON ONT management and control interface specification.
	ITU-T G.987.1: XG-PON, General requirements.

	ITU-T G.987.2: XG-PON, Physical media dependent (PMD) layer specification.
	ITU-T G.987.3: XG-PON, Transmission convergence (TC) specifications
	ITU-T G.988: XG-PON, ONU management and control interface (OMCI) specification
	ITU-T G.698.3: Seeded WDM-PON
	ITU-T G.8261: Timing and Synchronization aspects in packet networks.
	ITU-T G.8262: Timing characteristics of synchronous Ethernet equipment slave lock.
	IEEE 802.1ad Provider Bridges
	IEEE 802.1ag Ethernet OAM
	IEEE 802.1D Spanning Tree Protocol
	IEEE 802.1p VLAN prioritization
	IEEE 802.1Q VLAN tagging
	IEEE 802.1w Rapid Spanning Tree Protocol of at least 8 ports, based on port-based, address-based, and round robin
	IEEE 802.1p VLAN prioritization.
	IEEE 802.1Q VLAN tagging.
	IEEE 802.3 10 Mbps Ethernet
	IEEE 802.3u 100 Mbps Fast Ethernet
	IEEE 802.3ad Ethernet Link Aggregation
	IEEE 802.3ae 10 Gigabit Ethernet
	IEEE 802.3z Gigabit Ethernet
	IEEE 802.3x Flow Control
	IETF RFC 2131: DHCP
	IETF RFC 2132: DHCP Options and BOOTP Tenderer Extensions
	IETF RFC 2236: Internet Group Management Protocol, Version 2.
	IETF RFC 2933: Internet Group Management Protocol Management Information Base
	IETF RFC 3046: DHCP Relay Agent Info Option (Option 82)
	IETF RFC 3376: Internet Group Management Protocol, Version 3
9	**OLT Hardware features**
	The OLT shall be rack mountable and meet ETSI standards for indoor equipment requirement.
	The OLT shall be designed to Operate at 210-250V ac Dual Redundant Power supplies Operating temp 0 to 65 centigrade
	Fan is required for cooling the OLT to force airflow.
	The OLT shall provide one craft port for local configuration access.
	The OLT shall support one 10/100M Ethernet port for linking with EMS.
	The equipment must support a minimum splitting ratio of 32 splits or more.
10	**Physical interfaces supported/loaded**
	Supporting Ethernet interfaces towards the FTTx network is the mandatory requirement.
	The offered OLT should support 4 GPON interfaces, 2 x 1G SFP interfaces ,2 x 10 G SFP+ interfaces

8 Port OLT specification

S. No	OLT – 8 Port Technical Specifications
1	**Generic Requirements**
	The FTTx solution should be based on GPON, XG-PON1 / Point-to-Point Active Ethernet.
2	**Service Interfaces**
	GPON, 2.5G downstream, 1.25G upstream.
	The equipment must be able to operate at the physical distance of 20 km and above (between OLT and ONU/ONT) without any additional amplification required.
	The OLT should support 1310 and 1490 nm wavelengths
	No. Of Subscribers per GPON port minimum is 128 (Splitting ratio 1:128)
	The system shall be support at least 4*GbE / 10xGbE network connections and should be pre-populated with 2 10G SFPs from day 1
	The FTTx platform shall be modular, with minimum of 40Gbps switching capacity.
	The Interfaces for the offered FTTx systems shall be of “plug in type (PIU) SFP modules”
	The offered OLTs/MDUs/HGWs shall be inter-operable with any third party ONTs as per the OMCI standards and must at least be certified by the Broadband Forum BBF.247. Inter-operability tests shall be done with different vendors
3	**Element management Requirements**
	Unified Element Management system (EMS) which can manage all the supplied OLTs & ONTs should be offered.
	The EMS should be able to work in cluster mode to scale easily for the management and monitoring requirements of the supplied OLTs and ONTs
	Network Management System for the offered equipment to provide the capabilities for configuration, operation, monitoring, remote monitoring, fault localization, and data storage.
	The management solution must support comprehensive service assurance functions including fault and performance monitoring
	The management solution should expose REST API for integration with other OSS/BSS applications
4	**FTTx SYSTEM GENERAL REQUIREMENTS**
	Compliant to the relevant ISO/ETSI industry quality standards (e.g. ISO 9000/9001), defining the quality system requirements for the design, development, production, delivery, installation and maintenance of product and services.
	The offered equipment shall be able to inter-work with the other user end equipment supplied by other vendors as per ITU-T specifications.

	The offered equipment shall support single fiber operation on standard SMF G.652, G.655 & G.657.
	The IGMP forwarding capabilities on OLT should be no less than 2000pps,
	The equipment shall support IPv4 and IPV6.
	The equipment shall support Multicast IPv4 & IPv6 and MLD Version1 & 2
	The equipment shall detect the optical power transmission of every ONT, once that it detects some problems in the status of the optical transmission power. The system shall disable the defective ONT automatically in order to guarantee the normally use of the others.
5	**The following VLAN Operations need to be supported:**
	Mapping of subscriber VLAN to a common service VLAN
	Translate/re-write subscribers VLAN ID to another VLAN ID
	VLAN switching
	Mapping of the subscriber traffic based on the IEEE 802.1p priority tagging to a specific VLAN.
	Mapping of the subscriber traffic based on the IEEE 802.1Q VLAN ID to a specific VLAN
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6	**Subscriber Access methods supported**
	DHCP, DHCP option 82/60/43/37/18, Static IP, PPPoE
	Shall support multiple service delivery of data, voice and video.
	Shall support IP policing at the network and subscriber end.
	Shall support Ethernet 802.1p and IP TOS bit prioritization.
	The OLTs shall be able to support mobile traffic backhauling.
	Support for the Building Integrated Timing Supply (BITS), 10 MHz, 1 pulse per second (1PPS), and time of day (TOD) interfaces. supports synchronous Ethernet (SyncE) and IEEE-1588 functionalities and Shall act as the source for network clocking for TDM, SDH and SONET, SyncE, and GPS interfaces. In addition to the timing services
	The Equipment must support IP Multicasting to cater for interactive services such as broadcast IPTV, distance learning, etc.
	Static routing and Dynamic routing
7	**QoS Features supported**
	Trusted connectivity where the QoS setting / traffic prioritization configured by customer can be preserved.
	Un-trusted connectivity where the QoS setting / traffic prioritization configured by customer can be overwritten by the Equipment.
	The detail Downstream and Upstream QoS and traffic prioritization mechanism supported inclusive of the hardware queue available for each direction. A minimum of 8 hardware queues should be supported at both directions. The OLT should implement some queuing mechanism to manage the hardware queue such as SP, WRR, etc.
	Management System shall support bandwidth provisioning starting from 64 kbps granularity.

	Shall support Dynamic Bandwidth Allocation (DBA) mechanism to allow optimum bandwidth utilization on each PON interface. The detail implementation and capability of DBA mechanism should be explained in detail.
	Shall support basic OAM features such as loop back, remote diagnostic, CC and Link Trace complies with IEEE 802.1ag.
	Shall support port-mirroring function for trouble shooting, monitoring, and tracing purpose.
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	The OLT shall be designed to Operate at 210-250V ac Dual Redundant Power supplies Operating temp 0 to 65 centigrade
	Fan is required for cooling the OLT to force airflow.
	The OLT shall provide one craft port for local configuration access.
	The OLT shall support one 10/100M Ethernet port for linking with EMS.
	The equipment must support a minimum splitting ratio of 32 splits or more.
10	**Physical interfaces supported/loaded**
	Supporting Ethernet interfaces towards the FTTx network is the mandatory requirement.
	The offered OLT should support 4 GPON interfaces, 4 x 1G SFP interfaces ,4 x 10 G SFP+ interfaces
	The offered OLT should be expandable to support additional 4 x GPON interfaces.

16 port OLT Specification:

S. No.	Technical Specifications
1	Generic Requirements
	The FTTx solution should be based on GPON
	Warranty is 5 years from the date of commissioning
2	Service Interfaces
	GPON, 2.5G downstream, 1.25G upstream.
	The equipment must be able to operate at the physical distance of 20 km and above (between OLT and ONU/ONT) without any additional amplification required.
	The OLT should support 1310 and 1490 nm wavelengths
	No. Of Subscribers per GPON port minimum is 128 (Splitting ratio 1:128)
	The FTTx platform shall be with complete non-blocking architecture
	The system shall be support 8*GbE / 10xGbE network connections and should be pre-populated with 4 10G SFPs from day 1
	The FTTx platform shall be modular, with minimum of 40Gbps switching capacity.
	The Interfaces for the offered FTTx systems shall be of “plug in type (PIU) SFP modules”
	The offered OLTs/MDUs/HGWs shall be inter-operable with any third party ONTs as per the OMCI standards and must at least be certified by the Broadband Forum BBF.247. Inter-operability tests shall be done with different vendors

3	Bidder should supply all the necessary licenses for full FCAPS management through GPON NMS for the supplied nodes. In case the devices need a new EMS to manage the devices, bidder has to factor in all the costs associated with hardware/software and licenses for the new EMS/NMS and the integration efforts to make it work with existing APSFL OSS/BSS and other IT systems
4	FTTx SYSTEM GENERAL REQUIREMENTS
	compliant to the relevant ISO/ETSI industry quality standards (e.g. ISO 9000/9001), defining the quality system requirements for the design, development, production, delivery, installation and maintenance of product and services.
	The offered equipment shall be able to inter-work with the other user end equipment supplied by other vendors as per ITU-T specifications.
	The offered equipment shall support single fiber operation on standard SMF G.652, G.655 & G.657.
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	The equipment shall support Multicast IPv4 & IPv6 and MLD Version1 & 2
	The equipment shall detect the optical power transmission of every ONT, once that it detects some problems in the status of the optical transmission power. The system shall disable the defective ONT automatically in order to guarantee the normal use of the others
5	The following VLAN Operations need to be supported:
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	Mapping of the subscriber traffic based on the IEEE 802.1p priority tagging to a specific VLAN.
	Mapping of the subscriber traffic based on the IEEE 802.1Q VLAN ID to a specific VLAN
	Mapping of the subscriber traffic based on the combination of IEEE 802.1p and 802.1Q tagging to a specific VLAN
6	Subscriber Access methods supported
	DHCP, DHCP option 82/60/43/37/18, Static IP, PPPoE
	Shall support multiple service delivery of data, voice and video.
	Shall support IP policing at the network and subscriber end.
	shall support Ethernet 802.1p and IP TOS bit prioritization.
	The OLTs shall be able to support mobile traffic backhauling.
	support for the Building Integrated Timing Supply (BITS), 10 MHz, 1 pulse per second (1PPS), and time of day (TOD) interfaces. supports synchronous Ethernet (SyncE) and IEEE-1588 functionalities and Shall act as the source for network clocking for TDM, SDH and SONET, SyncE, and GPS interfaces. In addition to the timing services
	The Equipment must support IP Multicasting to cater for interactive services such as broadcast IPTV, distance learning, etc. The detail implementation of multicasting mechanism must be explained.
	Static routing and Dynamic routing

7	QoS Features supported
	Trusted connectivity where the QoS setting / traffic prioritization configured by customer can be preserved.
	Un-trusted connectivity where the QoS setting / traffic prioritization configured by customer can be overwritten by the Equipment
	The detail Downstream and Upstream QoS and traffic prioritization mechanism supported inclusive of the hardware queue available for each direction. A minimum of 8 hardware queues should be supported at both directions. The OLT should implement some queuing mechanism to manage the hardware queue such as SP, WRR, etc.
	Management System shall support bandwidth provisioning starting from 64 kbps granularity.
	Shall support Dynamic Bandwidth Allocation (DBA) mechanism to allow optimum bandwidth utilization on each PON interface. The detail implementation and capability of DBA mechanism should be explained in detail.
	Shall support basic OAM features such as loop back, remote diagnostic, CC and Link Trace complies with IEEE 802.1ag.
	Shall support port-mirroring function for trouble shooting, monitoring, and tracing purpose. The bidder shall explain the port-mirroring function mechanism in detail.
8	ITU-T / IEEE RELATED SPAECIFICATIONS
	Shall comply to ITU-T/IEEE recommendations.
	ITU-T G.652: Characteristics of a single-mode optical fiber and cable.
	ITU-T G.757: Characteristics of a Bending Loss Insensitive Single Mode Optical Fiber and Cable for the Access Network
	ITU-T G.984.1: GPON General Characteristics.
	ITU-T G.984.2: GPON Physical Media Dependent (PMD) layer specification.
	ITU-T G.984.3: GPON Transmission convergence layer specification.
	ITU-T G.984.4: GPON ONT management and control interface specification.
	ITU-T G.8261: Timing and Synchronization aspects in packet networks.
	ITU-T G.8262: Timing characteristics of synchronous Ethernet equipment slave lock.
	IEEE 802.1ad Provider Bridges
	IEEE 802.1ag Ethernet OAM
	IEEE 802.1D Spanning Tree Protocol
	IEEE 802.1p VLAN prioritization
	IEEE 802.1Q VLAN tagging
	IEEE 802.1w Rapid Spanning Tree Protocol of at least 8 ports, based on port-based, address-based, and round robin or ERPS shall be supported.
	IEEE 802.1p VLAN prioritization.
	IEEE 802.1Q VLAN tagging.
	IEEE 802.3 10 Mbps Ethernet
	IEEE 802.3u 100 Mbps Fast Ethernet
	IEEE 802.3ad Ethernet Link Aggregation
	IEEE 802.3ae 10 Gigabit Ethernet

	IEEE 802.3z Gigabit Ethernet
	IEEE 802.3x Flow Control
	IETF RFC 2131: DHCP
	IETF RFC 2132: DHCP Options and BOOTP Tenderer Extensions
	IETF RFC 2236: Internet Group Management Protocol, Version 2.
	IETF RFC 2933: Internet Group Management Protocol Management Information Base
	IETF RFC 3046: DHCP Relay Agent Info Option (Option 82)
	IETF RFC 3376: Internet Group Management Protocol, Version 3
	Any other standards inter-related with all the above Specifications and any other standards deemed necessary by the bidder.
9	OLT Hardware features
	The OLT shall be rack mountable and meet ETSI standards for indoor equipment requirement.
	The OLT shall be designed to Operate at 210- 250 V ac Dual Redundant Power supplies Operating temp 0 to 65 centigrade
	Fan is required for cooling the OLT to force airflow.
	The OLT shall provide one craft port for local configuration access.
	The OLT shall support one 10/100M Ethernet port for linking with EMS.
	The equipment must support a minimum splitting ratio of 32 splits or more.
10	Physical interfaces supported/loaded
	Supporting Ethernet interfaces towards the FTTx network is the mandatory requirement.
	The offered OLT should support 16 GPON interfaces with all the interfaces populated from day 1, 8 x 1/10G SFP+ interfaces for uplink with at least 4x10g 10Km SFP populated from day 1
11	Element management Requirements
	Unified Element Management system (EMS) which can manage all the **supplied OLTs &ONTs** should be offered.
	The EMS should be able to work in cluster mode to scale easily for the management and monitoring requirements of the supplied OLTs and ONTs
	Vendor shall offer Element Management System for the offered equipment to provide the capabilities for configuration, operation, monitoring, remote monitoring, fault localization, and data storage.
	The management solution must support comprehensive service assurance functions including fault and performance monitoring
	The management solution should expose REST API for integration with other OSS/BSS applications of APSFL.
	Vendor needs to provide the Hardware and software required to scale up and host the Element Management System to support the OLTs and ONTs supplied as per of the scope
12	Vendor must factor in all the costs associated with hardware/software and licenses for the EMS/NMS and the integration efforts to make it work with existing APSFL OSS/BSS and other IT systems.

OLT - 32 Port Specification:

Sl. No	Description	Details
1	Modular GPON OLT	Modular GPON OLT
		Backplane physical bandwidth 2.5Gbps per PON port
		Active Ethernet 1GbE/10GE shall support for uplink interfacing;
		19" mountable Chassis
		Required interface/ Ports:
		32 PON ports with 32/24 ports populated with SFPs from day 1 as per SOR At least 8x10G ports with 4 * 10 Gbe XFP/SFP+ fully populated from day 1
		The OLT should support 1310 and 1490 nm wavelengths
		No. Of Subscribers per GPON port minimum is 128 (Splitting ratio 1:128) The system shall be support multiple GbE / 10xGbE network connections.
		Warranty is 5 years from the date of commissioning
		Necessary license for GPON NMS
	GPON (ITU-TG.984.4) and Security	Downstream/Upstream bit rate: 2,488/1,244 Gbps, Advanced Encryption Standard (AES), Forward Error Correction (FEC), Maximum Differential Distance: 20 km.
	L2 layer	Services: 1:1, N:1 (TR-156i3), VLAN-ID conversion to GEM port-ID,Transparent: Add/change S-TAG and C-TAG, Load balancing LACP, Priority bits (p-bits) included in changes,Performance: GPON full wire speed
	Synchronism	SYNC-E, IEEE1588v2/PTP
	IPTV features	IGMPv2/v3 snooping with proxy reporting, multicast, IPTV streams forwarding: 1024.
	Management	Local management by HTTP Web Browser
		Remote using SNMTP and HTTP protocols.
		CPE remote management over OMCI G.984.4 channel.
	Interoperability	OLT family system NMS assure layer 2 and layer 3 interoperability with the transport segment of the network, according to Rec BBF TR-156/247. NMS/EMS should support existing BSS/OSS solution with rest API interface. Network Management System for the offered equipment to provide the capabilities for configuration, operation, monitoring, remote monitoring, fault localization, and data storage.

	Environment	Compliant with partly temperature - controlled locations recommendation as stated by ETSI ETS 300 019-1-3 Class 3.2 0 to +65oC, 0 - 95% of Relative Humidity range. Note: The specifications mentioned are minimum desired specification. Vendor can quote higher specifications.
	EMC	Compliant with at ETSI EN 300 386 recommendation / or equivalent IEC/EN standards
	Scalability	OLT equipment family system NMS are reliable modular Optical Line Termination (OLT) equipment specially devoted for fiber network infrastructures either Point-to-Point (P2P), Active Ethernet (AE) or Point-to-Multipoint (P2MP) FTTx Gigabit Passive Optical Network (GPON) architectures as well as assuring next generation PON technologies as XGPON-1 and NGPON2 (TWDM PON)
2	Vendor should supply all the necessary licenses for full FCAPS management through GPON NMS for the supplied nodes. In case the devices need a new EMS to manage the devices, bidder has to factor in all the costs associated with hardware/software and licenses for the new EMS/NMS and the integration efforts to make it work with existing APSFL OSS/BSS and other IT systems.	
3	FTTx SYSTEM GENERAL REQUIREMENTS	
	Compliant to the relevant ISO/ETSI industry quality standards (e.g. ISO 9000/9001), defining the quality system requirements for the design, development, production, delivery, installation and maintenance of product and services.	
	The offered equipment shall be able to inter-work with the other user end equipment supplied by other vendors as per ITU-T specifications.	
	The offered equipment shall support single fiber operation on standard SMF G.652, G.655 & G.657.	
	The IGMP forwarding capabilities on OLT should be no less than 2000pps,	
	The equipment shall support IPv4 and IPV6.	
	The equipment shall support Multicast IPv4 & IPv6 and MLD Version1 & 2 The equipment shall detect the optical power transmission of every ONT, once that it detects some problems in the status of the optical transmission power. The system shall disable the defective ONT automatically in order to guarantee the normally use of the others.	
4	The following VLAN Operations need to be supported:	
	Mapping of subscriber VLAN to a common service VLAN	
	Translate/re-write subscribers VLAN ID to another VLAN ID	
	VLAN switching	
	Mapping of the subscriber traffic based on the IEEE 802.1p priority tagging to a specific VLAN.	
	Mapping of the subscriber traffic based on the IEEE 802.1Q VLAN ID to a specific VLAN	

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	ITU-T G.987.1: XG-PON, General requirements.
	ITU-T G.987.2: XG-PON, Physical media dependent (PMD) layer specification.

	ITU-T G.987.3: XG-PON, Transmission convergence (TC) specifications
	ITU-T G.988: XG-PON, ONU management and control interface (OMCI) specification
	ITU-T G.698.3: Seeded WDM-PON
	ITU-T G.8261: Timing and Synchronization aspects in packet networks.
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Pricing Proposal

S.NO	Item (Box Type)	Model ID	Pricing (INR)
1.	**Combo Box for gaining internet Access – 2.5GHz (Single Band)**		
2.	**Combo Box for gaining internet Access – 2.5/5.0GHz (Dual Band)**		
3.	**Android IP STB gaining access to Internet**		
4.	**4 port OLT (per port for 100 Boxes)**		
5.	**8 port OLT (per port for 100 Boxes)**		
6.	**16 port OLT (per port for 100 Boxes)**		
7.	**32 port OLT (per port for 100 Boxes)**		

At any time prior to the last date for receipt of offer, APSFL may for any reason, whether at its own initiatives or in response to a clarification requested by a prospective bidder, modify the EOI document and all formats including annexure by issuing clarification(s) and or amendment(s). In order to provide prospective bidders reasonable time to take the amendment into account in preparing their offers, APSFL may, at its sole discretion, extend the last date for receipt of offers and/or make other changes in the requirements set out in the invitation for EOI.