



**PAKISTAN TELECOMMUNICATION COMPANY LIMITED
HEADQUARTERS, G-8/4, ISLAMABAD**

DATE: 04th September, 2020

REQUEST FOR INFORMATION (RFI)

FOR

HYBRID VDSL MODEM WITH CHARJI FALLBACK



PAKISTAN TELECOMMUNICATION COMPANY LTD.
HEADQUARTERS, G-8/4, ISLAMABAD

REQUEST FOR INFORMATION (RFI)

Dated: 04th September, 2020

SUBJECT: HYBRID VDSL MODEM WITH CHARJI

1. PTCL intends to invite vendors to share information & recommendations regarding various VDSL Modem models that may be used for provisioning of Broadband services to PTCL Customers.
2. Soft copies of proposal/solution shall be submitted in the office of undersigned as per instructions provided in RFI document on or before **12:00 Hours on 21st September, 2020.**
3. Bids/solution received after the above deadline shall not be accepted and returned unopened. Bids through Email/Fax/Courier shall not be accepted.
4. PTCL reserves the right to reject bids/solution and to annul the RFI process at any time, without thereby incurring any liability to the affected bidder or any obligations to inform the affected bidder of the grounds for PTCL action.
5. Bidder must mention their Bidder Registration code on offer. In case Bidder is not registered, then registration must be done before the issuance of Letter of Award/Intent. Bidder Registration form can be downloaded from PTCL website: <https://www.ptcl.com.pk/Info/Vendor-Registration-Form>
6. All correspondence on the subject may be addressed to the undersigned and Bids shall be submitted on the address given below.

GM Procurement (Business Support)

Room # 18, 4th Floor, Old Building
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REQUEST FOR INFORMATION (RFI)

HYBRID VDSL MODEM WITH CHARJI FALLBACK

1. PURPOSE: Pakistan Telecommunication Company Limited (PTCL), the largest ICT service provider in the country is issuing a request for information from qualified vendors for supply of VDSL Modems with LTE Fallback functionality for PTCLs' valued customers, with the intention of providing a reliable redundancy for customers when there is broadband outage or to function as standalone LTE modem in areas where broadband is unavailable. The purpose of this document is to provide broad level specifications of the sought modem equipment and gather information regarding possible solutions from prospective vendors. No contract will be awarded based on the responses to this RFI received. PTCL may or may not choose to issue a solicitation to contract for these devices. PTCL may or may not choose to incorporate information gathered through this RFI into possible future requirements.

2. OBJECTIVE: The intent of the RFI is to gather information; it is not a formal procurement. However, a formal procurement action may result from this information-gathering process. The purpose of this RFI is to:

- Obtain information regarding various **VDSL Modem** models that may be used for provisioning of Broadband services to PTCL Customers. The Modems are required to **contain 4G failover functionality through internal sim slot for PTCL's CharJi LTE Service.**
- Obtain comprehensive specifications/feature sets of the abovementioned equipment.
- Obtain input in the form of recommendations and proposals from qualified respondents with regards to solutions available in the market to achieve the desired objective (delivery of Broadband service with LTE as a fallback feature in a cost-effective manner). Bidders should ensure to include pricing against the various proposed solutions.
- Obtain vendor/firm information regarding successful supply of this product previously to other corporations and organizations.

3. PTCL RESERVED RIGHTS

- 3.1 PTCL reserves the rights to make any changes to the specifications at any time without any prior notice.
- 3.2 PTCL does not guarantee that the requirements, standards, regulations, and/or conditions stated in this document of specifications are not covered / protected by copyright or patent of a third party.
- 3.3 PTCL has the rights to accept or reject the offered proposals without any notice or explanation.

4. BROAD LEVEL REQUIREMENTS

GENERAL TECHNICAL STANDARDS (VDSL2 modem with auto fallback to ADSL)

4.1 Standard

The offered CPE shall comply with the following ITU-T and DSL Forum recommendations that are applicable for the CPE. Any deviations to the same shall be pointed out.

- 4.1.1 G.993.1: Very high speed digital subscriber line transceivers (VDSL)
- 4.1.2 G.993.2: Very high speed digital subscriber line transceivers 2 (VDSL2)
- 4.1.3 G.993.5: Self-FEXT cancellation (vectoring) for use with VDSL2 transceivers
- 4.1.4 G.992.1 (G.DMT): Corresponding to Asymmetric Digital subscriber Line (ADSL) transceivers. Annex A & B shall be included.
- 4.1.5 G.992.2 (G.lite): Corresponding to Splitter less/with Splitter Asymmetric Digital subscriber Line (ADSL) transceivers.
- 4.1.6 G.992.3: Corresponding to Asymmetric Digital Subscriber Line transceivers–2 (ADSL2). Annex A, B & L shall be included.
- 4.1.7 G.992.4: Corresponding to Splitter less/ with Splitter Asymmetric Digital Subscriber Line transceivers – 2 (ADSL2+).
- 4.1.8 G.992.5: Corresponding to Asymmetric Digital Subscriber Line transceivers – extended bandwidth (ADSL2+). Annex A & B shall be included.

- 4.1.9 ITU G.992.5 Annex M: ADSL2+M / ADSL2+ (Leased Circuit) (1) Annex M option should be enabled by default
- 4.1.10 G.994.1: Corresponding to Handshake procedures for Digital Subscriber Line (DSL) transceivers.
- 4.1.11 ITU-T G-series Recommendations – Supplement 50: Corresponding to Overview of digital subscriber line (DSL) Recommendations.
- 4.1.12 G.996.1: Corresponding to Test procedures for digital subscriber line (DSL) transceivers.
- 4.1.13 G.997.1: Corresponding to Physical layer management for digital subscriber line (DSL) transceivers.
- 4.1.14 G.998.1: ATM-based multi-pair bonding (optional, required for bonding support only)
- 4.1.15 G.998.2: Ethernet-based multi-pair bonding (optional, required for bonding support only)
- 4.1.16 ITU-T G.998.3: Multi-pair bonding using time-division inverse multiplexing (optional, required for bonding support only).
- 4.1.17 ITU-T G.998.4: Improved impulse noise protection for DSL transceivers
- 4.1.18 ITU-T G.999.1: Interface between the link layer and the physical layer for digital subscriber line (DSL) transceivers
- 4.1.19 TR-067: Corresponding to ADSL Interoperability Test Plan.
- 4.1.20 TR-062: DSL Forum ILMI Auto-Configuration.
- 4.1.21 TR-064: DSL Forum LAN Management.
- 4.1.22 TR-068, TR-069: Compliance to this standard to facilitate WAN side CPE management, such as secure Auto Configuration by ACS etc.
- 4.1.23 TR-098, TR-104, TR-106, TR-110, TR-111 & TR-133 – Triple play Management Platform
- 4.1.24 G.711, G.723, G.726, G.729 Voice Codecs
- 4.1.25 H.323, H.225 and H.245 Protocols
- 4.1.26 RTP/RTCP (RFC1889, 1890), SIP (RFC 3261), MGCP (RFC3435) and H.248 - Standards support for CPE to function as Voice Gateway.
- 4.1.27 RFC1889 RTP, RFC 2327 SDP
- 4.1.28 RFC 2364 PPP over ATM
- 4.1.29 RFC1483 Multi-protocol encapsulation over ATM
- 4.1.30 RFC 2516 PPP over Ethernet (MAC Encapsulated)
- 4.1.31 RFC 2684 Bridged and Routed LLC and VC Mux support.
- 4.1.32 The offered CPE shall support the transport and multiplexing of ATM over ADSL.
- 4.1.33 The offered CPE must be compatible and should show high performance i.e. Reach/ Bit rate and stability, against PTCL Central Office equipment supplied by other vendors as per ITU-T, DSL Forum and ATM Forum and Broadband Forum specifications.
- 4.1.34 The offered CPE must be capable of supporting Fixed and Rate Adaptive Data Transmission and Equalization Modes based on DMT Modulation.
- 4.1.35 The CPE shall be capable of dynamically adapting to the characteristics of the customer copper loop to achieve the parameters configured on the CPE and avoid receiver saturation.
- 4.1.36 The offered VDSL2 CPE shall support band plans Annex-A/Annex-B and band profiles 8a,8b,8c,8d,12a,12b,17a and 30a.
- 4.1.37 The offered VDSL2 CPE shall fully support ADSL2+ compatible mode without any limitation and performance degradation and with auto-fall back/fall forward feature.
- 4.1.38 The bidder shall state the minimum and maximum configurable data rate in downstream and upstream directions that can be achieved by the offered CPE for both VDSL2 and ADSL2+. Necessary graphical chart to be submitted, which displays the Bandwidth achievement of the CPE for different line length/gauge of copper loop.
- 4.1.39 The offered CPE shall support UNI 3.1/4.0, AIS, RDI & Operation, Administration and Maintenance (OAM) F4 & F5 Loop back functions, ATM ping, DNS Ping, ICMP Ping along with its configuration through its router management page.
- 4.1.40 The bidder shall specify/describe the available features for managing the offered CPE in detail. 4.1.41 The offered CPE shall support Remote or LAN/WAN Administration with options to configure, toggle off/on, change ports etc. through its management page.
- 4.1.42 The bidder/supplier shall provide the MIB (Management Information Base) along with the CPE delivery.
- 4.1.43 The bidder shall state the size of on-board memory, CPE hardware details.

- 4.1.44 The bidder shall state the maximum number of PVCs (preferably up to 8 PVCs) supported by the offered CPE and the supported VPI/VCI ranges, whereby all PVCs function concurrently and independently.
- 4.1.45 The Bidder shall provide full details on his role in ITU-T and DSL Forum on the area of xDSL . 4.1.46 The bidder is obliged to advise PTCL of any Software/ Firmware upgrades on each of the quoted units to enhance the supported PTM/ATM, IP, Video etc. features and the DSL Chipset performance. The same shall be supplied to PTCL at no additional cost.
- 4.1.47 The offered equipment shall comply with Discrete Multi-Tone (DMT) Modulation Scheme.
- 4.1.48 The Operator shall be able to optimize the bit rates of the offered equipment to match the specific requirement of each individual subscriber loop.
- 4.1.49 Complete details information regarding the connection should be displayed in router management page along with information such as path type interleaved path/fast path, IP, DNS Servers, DSL connection statistics etc.
- 4.1.50 The offered CPE shall support Bit Error Rate (BER) better than 10⁻⁷ with 6-dB noise margin.
- 4.1.51 Forward Error Correction function should be available with BER without affecting the performance of the CPE.
- 4.1.52 The CPE should not have any interference beyond WiFi standard transmission.
- 4.1.53 The modem shall interface between the Personal Computer and the ATU-C equipment (e.g. ATM cell format specified in ITU-T Rec. I.361) etc.
- 4.1.54 The offered equipment shall support RFC 2684 (formerly RFC1483) Routed and Bridged, PPPoATM, PPPoEthernet Relay/bridging, Static Routes including support for PVC and SVC connection types, multiple ARP servers, and multiple clients. Shall be able to support both Bridged PVC and Routed PVC mode simultaneously.
- 4.1.55 The offered CPE shall support ANSI T1.413 Issue 2, Annex A
- 4.1.56 The offered CPE shall have Integrated PPPoE Client functionality, so as to make it compatible with all operating systems.
- 4.1.57 The offered CPE shall support MPoA functionality (RFC2684).
- 4.1.58 The Bidder shall state the Roadmap for the latest DSL Technologies that are globally relevant during the Tender Submission Period
- 4.1.59 The offered CPE shall support ATM traffic classes such as UBR, UBR+, rt-VBR, nrtVBR, CBR, ABR etc.
- 4.1.60 The offered CPE shall support L3 (Layer 3) Policy based QoS, IP QoS and ToS.

4.2 Hardware Specifications:

VDSL2/ADSL2+ Modem Hardware Specifications	
Components	Minimum Specifications
Processor	Dual Core 600MHz
Chipset	Tier 1 OEM
RAM	64/128 MB
Flash	128MB
WiFi Standards	802.11 b/g/n, 802.11ac
Antenna System	2x2 MIMO or higher
WiFi Band Supported	Single band 2.4GHz, Dual Band 2.4GHz and 5 GHz
Antenna Gain	5dBi
Antenna	External
USB	No of port: 1 Type: USB 2.0 or higher 6.1.31.2 Connector Type: Type A (plug) 6.1.31.3 Compliance: 5.0 V 500 mA (max 1000 mA)
TR-069 Support	Yes
Dual Imaging	Yes
VDSL2 Fallback to ADSL2+	Yes
Ethernet Interfaces	4 FE , Auto Sensing, Auto MDIX
LED indications	Power, WAN/DSL, Internet, WLAN, Lan1, Lan2, Lan3, Lan4, WPS, USB (if available), 4G LTE
Buttons	Power ON/Off, WPS, WLAN, Reset (hole)
Interfaces:	DSL Phone Line Port (RJ11), Ethernet interface (RJ 45, Lan1-4), WiFi, USB, SIM slot (PTCL 4G LTE).

Wi-Fi (802.11 b/g/n) Specifications

- 4.2.1 The proposed device should have at least built in Wi-Fi IEEE802.11a / IEEE802.11b / IEEE802.11g / IEEE802.11n; **N300 minimum**, WiFi Antenna Gain; **5dBi minimum**, Antenna System; **2x2 MIMO antennas minimum**.
- 4.2.2 Vendor shall quote both Single band and Dual band CPEs, Simultaneous Dual Band N600 or above for fast wireless transfer rates – Dynamic Rate scaling from port capability with Auto-fallback feature. Simultaneous Dual Band Wi-Fi utilizing 5GHz and 2.4GHz frequency so supporting new and old devices and higher bandwidth. Frequency, Channel Hopping, Transmission Power etc. to be Auto as well as User Definable. Bidder shall notify improvements if any with details
- 4.2.3 Output Power (Wi-Fi): Offered modem shall be capable to cater higher coverage area in homes, offices and buildings. Bidder must state the indoor and outdoor coverage radius in meters but it should not be less than 300 meters.
- 4.2.3 The proposed device should comply IEEE 802.1x Standard and certified by Wi-Fi Alliance (WECA). The Bidder shall provide the certification proof.

5. TECHNICAL SPECIFICATIONS/Software FEATURES OF CPE but not limited to the followings;

- 5.1.1 The bidder shall indicate whether the CPE has the feature of ITU-T Recommendation K21(10/2000) – Resistibility of subscribers' terminals to over voltages and over-currents.
- 5.1.2 LAN IP address Default 192.168.10.1 User Configurable
- 5.1.16 LAN Subnet Mask 255.255.255.0 User Configurable
- 5.1.17 Firewall
 - 5.1.17.1 WAN & LAN, Enabled for WAN, Disabled for LAN with Option to Toggle Off/On.
 - 5.1.17.2 Comprehensive/Detailed Firewall & Configurable Rules
 - 5.1.17.3 SPI/NAT support 6.1.17.4 MAC / IP / URL Filtering/Family Filter
- 5.1.18 Web Based Router Management Access
 - 6.1.18.1 All options customizable through router management page
 - 5.1.18.2 One standardized main page for easy router setup (easy setup page) for one page installation at customer end to be present (It will be standardized as per PTCL requirement) i User Name (DSL) ii Password (DSL) iii Rest options to be automatically defined as per PTCL for Easy Setup Page.
 - 5.1.18.3 All detailed and advanced options should also be present in the management page but separate from easy setup page for advanced/technical users
 - 5.1.18.4 All commonly and generically used options present in Routers to be incorporated in the router
 - 5.1.18.5 Router Management Page Default WAN Access = Off, LAN Access = On.
 - 5.1.18.6 User Configurable along with changing of access ports for the management page
 - i - Administration Username = Admin
 - ii Password = "All CPEs should have different random password written on back of CPE or last 5 characters of MAC Address"
 - iii User Configurable iv The CPE shall have the capability of the admin account lockout for 5 min with attempting 10 wrong password in GUI interface.
 - 5.1.18.7 All options in router management page to have an option in setup page to toggle off/on or customize options where applicable/can be done.
- 5.1.38 Individual VoIP clients and Phone numbers per Port
- 5.1.39 Quality of Service (QoS)
 - 5.1.39.1 Enabled with Option to Toggle Off/On.
 - 5.1.39.2 Network and CPE user control
 - 5.1.39.3 Bandwidth control and traffic priority management for user consoles along with QoS P802.1p
 - 5.1.39.4 WMM and Bandwidth Control
 - 5.1.39.5 It shall be possible to adjust priority levels for different services for good QoS.
- 5.1.40 IPV4 Full Support
- 5.1.41 IPV6 Ready
 - 5.1.41.1 IPV6 and IPV4 dual stack

- 5.1.41.2 Supported IPv6 Tunnels: DS-Lite, 6RD, 6 to 4
- 5.1.41.3 Supported IPv6 Connection Type: PPPoEv6, DHCPv6, Static IPv6
- 5.1.42 The CPE software shall be highly configurable with support for:
 - 5.1.42.1 Different MTU Size
 - 5.1.42.2 PCR per VC
 - 5.1.42.3 Transmit Rate
 - 5.1.42.4 Any other related details
- 5.1.43 IGMP
 - 5.1.43.1 IGMP snooping V1/V2/V3
 - 5.1.43.2 By default set to v2 with options to change
 - 5.1.43.3 IGMP Multicast
- 5.1.44 All ports to support Multicasting and H.S.I.
- 5.1.45 PTA Approval
- 5.1.46 CD-less installation
- 5.1.47 Vendor may add or propose any other additional features or improved features along with details
- 5.1.48 Further tweaking and firmware customization might also be required later while working with PTCL
- 5.1.49 Firmware update and feature additions as and when required
 - 5.1.49.1 Firmware to be pushed via TR-069
 - 5.1.49.2 Manual Firmware update option
 - 5.1.49.3 Latest Firmware to be shared with Product Commercial Team as well
 - 5.1.49.4 Automatic Firmware Update through Web Options to be Available
 - 5.1.49.5 All firm wares to be properly version controlled
 - 5.1.49.6 If newer version of firmware if being upgraded an older version of firmware, then user should be prompted with an Error that firmware being updated is an older version
 - 5.1.49.7 Firmware designed so wrong model firmware cannot be updated in order to remove chances of being bricked / remove misused of CPE
 - 5.1.49.8 User acceptance test to be given before release of every firmware
 - 5.1.49.9 Firmware configuration backup, restore and other related options to be present and incase a firmware is upgraded, old settings/configuration should not be disturbed
 - 5.1.49.10 The CPE shall support the firmware push and rollback feature (Dual imaging). During the firmware upgrade if there is any sort of disconnection, modem shall rollback to the older version
 - 5.1.49.11 Firmware to be further customized where required by Wireline Business – Commercial department during the course of time
 - 5.1.49.12 Keeping firmware up to date where required and adding features etc. to keep up with market trends, removal of bugs etc.
 - 5.1.49.13 All firmware changed to be free of cost
- 5.1.50 The offered CPE shall comply to the following Management features:
 - 5.1.50.1 Support of remote management/software update or upgrade, Automatic Provisioning feature

6. The Required Accessories:

VDSL2/ADSL2+ Modem
1 x Power Adapter
1 x Splitter (VDSL2/ADSL2+)
1 x Ethernet Cable (RJ45) with connector, 1.5meter length
2x Phone Cable (RJ 11) - (1x 2 meter and 1 x 6 inch)
User Manual, Basic Troubleshooting guide

7. 4G LTE Requirements - Integrated SIM Card Slot for 4G Connectivity.

4G LTE Requirements - Integrated SIM Card Slot for 4G Connectivity.		
Clause	Requirement	Parameter
1.1	LTE Band 2 Support	Uplink: 1850Mhz~1910Mhz, Downlink: 1930Mhz~1990Mhz
1.2	LTE Band 25 Support	Uplink: 1850Mhz~1915Mhz, Downlink: 1930Mhz~1995Mhz
1.3	Freq	LTE FDD 1900 MHZ
1.4	LTE Category	Cat3 or Above
1.5	Standard	3GPP TS36.306.
		E-UTRA User Equipment (UE) radio access capabilities
		3GPP Release 10 and above
1.6	Embedded SIM Card Slot	Standard SIM Card Slot
1.7	Antenna	Built-in Trans/Receive Antennas
		External LTE Antennas (1 or more)
1.8	Network Locked	SIM Card Slot to be network locked to PTCL CharJi LTE
1.9	RF/TX Power	Max Tx Power = 23 dBm, Max Input Signal level = -25 dBm, Min Output Power = < -40 dBm, Rx Sensitivity = -98 dBm @ 5MHz, -95 dBm @ 10 MHz;
2	MIMO	2*2 MIMO , 1 Rx/Tx Antenna, 1 Diversity Antenna (LTE & EVDO), VSWR <= 3.0, Peak Gain > 2 dBi, efficiency > 40%, Isolation = <-8 dBi, Input & Output resistance = 50 ohm, Polarization = vertical polarization
2.1	External Indicators	Ext. Indicators for Connection Mode, etc (4G/DSL?)
2.2	Auto Failover	Continuous 4G connectivity and minimum interruption by quickly and smoothly connecting to a 4G LTE network in the event xDSL fails. 4G Connectivity also to be ensured in standalone setting, in case xDSL connection is not feasible.

5. RESPONSES: Interested parties are encouraged to submit an electronic response to this RFI together with:

- Marketing materials (including information on your firm with a link to your website)
- Detailed description of the product(s), services and capabilities available
- Comments regarding pointwise compliance with required functionality mentioned in section 4
- Representative cost estimates for solution
- Delivery Timeline estimates
- Any additional information, details and value you may be able to add to the specifications mentioned in this document

Please note that this is not a Request for Proposal (RFP), but rather a Request for Information (RFI) giving vendors the opportunity to inform PTCL of the current capabilities they provide as well as available in the general market.