Call for Proposal

For collaborative development of variants of C-DOT Aggregators CAGG-24P-E & CAGG-24P-O

1. Introduction

Centre for Development of Telematics (C-DOT) is a premier telecom technology centre under the Department of Telecommunications (DOT), Ministry of Communications (MOC), and Government of India.

C-DOT has been developing various kinds of routers and switches, since last more than a decade. Some of these products have already been deployed in strategic networks. The transfer of the technology has been done to various PSUs and private organisations.

C-DOT Aggregator Products are a layer-2 managed switch and support either electrical or optical interfaces for interconnecting servers, clients, RAS, routers and other devices used in the intranet. The aggregators have 24X1Gb Ethernet ports and up to two 10Gb Ethernet optical ports for trunking /cascading. The switch device has an inbuilt CPU and acts as a carrier Ethernet switch with all the security and configuration features needed in a L2 switch. CLI and GUI interfaces are available for configuration and monitoring, along with an LED-based status display. It is packaged in a compact 1U height, 19" rack compatible form-factor.

C-DOT invites participation from the suitable Indian entities capable of partnering with C-DOT in collaborative development of project led by C-DOT for development and delivery of two variants of Layer -2 carrier Ethernet Switches based on the existing C-DOT Aggregator Products.
The potential participants should have demonstrable expertise in the telecom domain including complete hardware design and development and system engineering, supply chain management, assembly and hardware testing of the PCBs of telecom grade as well as EMI/EMC, Environmental and Safety Certification testing of the Product in NABL accredited external labs.

Keeping in mind the prospectus of the Layer2 Carrier Ethernet Switch technology and past development and deployment experience of this technology in various government projects, C-DOT believes that these variant Aggregator Products will have good market place in the Network in the near future.

The final outcome of the collaborative development project will be commercially deployable Aggregator Switches with Electrical and Optical Interfaces. The project outcomes can be further licensed to interested participants or third parties, capable of its mass production, marketing and deployments for end users, directly or in association with system integrators.

Through a process of rigorous technical evaluation, C-DOT shall select participants holding the most promise of delivering telecom grade products as per the specifications as its development partner in the project.

2. Project Description

There is a requirement to develop product variants for the following two types of existing 24 port Aggregator Products of C-DOT. The Product Brochure for the existing Products is attached in Annexure-1, for reference.

a) C-DOT Aggregator - Electrical version : CAGG-24P-E

C-DOT Aggregator (electrical version) as shown in below picture supports 1Gb Ethernet electrical interfaces (RJ-45) for interconnecting devices used in LAN segment. It has 24 X10/100/1000Mbps electrical ports and up to two 10Gb ethernet optical ports for trunking /cascading.

It has following network interfaces

- 24 x 10/100/1000 Base-T Ethernet ports
- 02 x 10G Ethernet over Optical Fibre (SFP+) uplink ports

Other interfaces & features available are

- 01X 10/100/1000Mbps Management RJ45 Port
- 01X DB9 RS232 Port
- Power Supply : Single 230V AC
- Form factor : 1U, 19" rack compatible

b) C-DOT Aggregator - Optical version : CAGG-24P-O

C-DOT Aggregator (Optical version) is very similar to the aggregator mentioned above. Instead of electrical interfaces towards the downlink side, it supports optical interfaces for interconnecting devices used in LAN segment. It has 24X1Gb optical ports and up to two 10Gb optical ports for trunking /cascading. It has all those features, which are available in electrical version of the aggregator.

It has following network interfaces

- 24 x 1G Ethernet over Optical Fibre (SFP)
- 02 x 10G Ethernet over Optical Fibre (SFP+) uplink ports

Other interfaces & features available are as follows

- 01X10/100/1000Mbps Management RJ45 Port
- 01X DB9 RS232 Port
- Power Supply : Single 230VAC
- Form factor : 1U, 19" rack compatible

3. Scope of work

The scope of work for the collaborator will be as follows.

The new variants of both the Aggregator types i.e., CAGG-24P-O & CAGG-24P-E, are required to be developed, to meet the following updated specifications in addition to all the functionality supported in the existing designs from C-DOT. The Product form-factor shall be 1U height, 19" rack compliant.

- 4 x 1G/10G SFP+ (dual-rate) optical uplink ports to be supported, in place of 2x 10G optical uplink ports in existing designs. The 24x1G (E)/(O) ports and 1 Management and 1 RS232 ports are required to be supported, as in the current system
- Dual Redundant power supply support with option for both 230V AC and -48V DC power input to be provided. The Power-supply should be field replaceable and removal of either of the redundant power supply should not bring-down the system
- Operating temperature range required to be supported is 0°C to 55°C, RH upto 95% non-condensing. The cooling sub-system and heat-sink/chassis design, components selection should align to these requirements.

- Fans used for cooling should be hot-swappable and Field-replaceable. The fans should be provided with n+1 redundancy
- Minimum 1GB RAM and 2GB flash memory to be provided
- The collaborator should carry out the Hardware Design and development including boards schematics, CAD realization including signal integrity and power integrity analysis, for the two new variants of the existing CAGG-24P-E switch and CAGG-24P-O Switches with the modifications specified, including the required system engineering and mechanical designs.
- BOM analysis to be carried out for substituting any EoL/NFD etc components with equivalent parts as well as for meeting the specified environmental/performance criteria.
- The collaborator should directly interact with all the device ODMs for getting the required technical support/clarifications for independently carrying out the board and system design and development. Any NDA's required with the ODMs of the components to be done by the collaborator directly.
- Component procurement for the modified bill of materials (BOM) for the boards and the system including internal cabling accessories and mechanical items like chassis/heatsink etc. The collaborator is required to build 10 proto systems of each of the two product variants.
- PCB fabrication based on the new design developed by the collaborator.
- PCB assembly and inspections.
- Development of mechanical chassis/and heatsink designs etc for meeting the specified environmental condition and thermal simulations/analysis of the system
- Hardware System Integration.
- Hardware testing of the assembled boards and system.
- Integration testing with C-DOT software, to be carried out at C-DOT premises, jointly along with C-DOT software team
- The Products developed should comply to the latest version of the following EMI/EMC standards and the collaborator should carry out the Certification testing on the final product (after software integration testing), in a NABL accredited TEC approved Lab, and submit the report.

  CISPR32 Class A for Conducted and Radiated Emissions
  IEC 61000-4-2 : Electrostatic discharge immunity
  IEC 61000-4-3 : Radiated, radio frequency, electromagnetic field immunity(RS)
  IEC 61000-4-4 : Electrical fast transient burst immunity
  IEC 61000-4-5 :Surge immunity
  IEC 61000-4-6 : Immunity to conducted disturbances, induced by RF fields(CS)
  IEC 61000-4-11 : Voltage dips, shot interruptions and voltage variations immunity test for AC powered System
  IEC 61000-4-29 : Voltage dips, shot interruptions and voltage variations immunity test for DC Powered System

- The Products developed should comply to the following Safety Standard and the collaborator is required to carry out the Safety Certification testing in NABL accredited TEC approved Labs for the same, and submit the certificate

  EN/IEC 60950-1: 2005 + Amendment 1:2009 + Amendment 2:2013 or equivalent BIS standard

- The Collaborator should Carry out the Environmental Testing of the Product for the specified temperature range in NABL accredited Lab, and submit the Certification Report
- The collaborator should prepare the required hardware documentation for the boards and system, as required for production TOT of the products
- The collaborator should submit a project plan for implementing the scope of work and will be required to submit fort-nightly status updates on the progress of the planned work.

4. Roles & Responsibilities of C-DOT

C-DOT shall provide the existing hardware design and BOM details for CAGG-24P-E and CAGG-24P-O products and shall carry out the software development for the product variants. C-DOT shall lead the software integration testing of the final product variants. C-DOT will provide financial support to the project partner selected through a process of evaluation and due diligence conducted by a committee of subject experts.

C-DOT shall license the final solution for mass production and deployment. Royalty proceeds received from licensing shall be distributed in ratio of the assessed value of the collaborator's contribution determined through mutual discussions while finalizing the product architecture. C-DOT shall engage with the Partner on a non-exclusive basis and shall retain its right to develop similar products / through other developmental programs.

5. Roles & Responsibilities of collaborator

Role of the partners is broadly outlined in section 3, as part of scope of work. The collaborator shall own the foreground technology developed by them. The collaborator may utilize the available test and infrastructure facilities offered by C-DOT with no financial implication for its usage. Participation in the project shall be on non-exclusive basis. The selected partner shall be required to demonstrate commitment to the project by entering into a formal agreement with C-DOT as per the CCRP policy.

6. Ownership of Outcomes

Background technologies used in the project shall continue to remain with their respective owners. New foreground technologies created during the project shall be owned by the respective developer. The ownership of the final solution shall rest collectively with C-DOT and its collaborator.

ACRONYMS AND ABBREVIATIONS

CCRP - C-DOT Collaborative Research Program
NDA – Non-Disclosure Agreement
ODM-Original Device Manufacturer

C-DOT Aggregator/L2 switch

Description

C-DOT Aggregator/ managed Layer 2 switch, a next generation switching product, built to address the challenges faced by service providers which provides unmatched level of service edge and carrier ethernet networking features with wire speed performance. The service aware architecture is designed to map data traffic to services, with individual services offering MEF complaint features like classification, policing, scheduling & traffic shaping for providing network based on Provider Bridge(PB), provider backbone bridge (PBB/Customer backbone switch)and provider backbone bridge with traffic engineering(PBB-TE).

Features

- 24 Gigabit Ethernet interfaces in Full Duplex mode(Electrical or Optical)
- Supports Static and LACP link aggregation with other L2 protocols.
- L3 includes Static routing with 32K L2/IPv4/IPv6 multicast groups
- Traffic prioritization (802.1p) & support for IEEE 802.1q priority.
- Traffic shaping & Rate limiting of bandwidth on switch ports.
- Stacking support oof 2 or more aggregators.

Physical Interfaces.
- 24 x 1G ethernet interface in Full Duplex mode (Electrical or Optical)
- 2 x 10G Gigabit Ethernet optical (SFP+) uplink ports.
- 1 x 1G dedicated Management port and serial console.

Packaging.
- 1U high system and can be mounted on a standard 19" rack mount.

Environmental.
- Temperature: Operating (0° C to +50°C), Storage (-10°C to +70°C).
- Humidity: Operating (10% to 95%)

Power Supply.
- Single input AC power supply (Mains).

Application Areas

- Network Interface Devices targeting Corporate Office locations and Cell site, RAS & other devices.
- Carrier Ethernet Access & aggregation switch
- Wireless backhaul targeting cell sites.
- Data Center Switch.

Ordering Information

CAGG-24P-E	CDOT 24 port aggregator (Electrical)
CAGG-24P-O	CDOT 24 port aggregator (Optical)

PRODUCT BRIEF

- L2 switching.
  - Spanning tree protocol.
  - Supports Link Aggregation & trunking features.
  - Loop protection & voice VLAN.
- L3 switching & multicasting.
  - Static routing.
  - Supports DHCP snooping & relay functions.
  - IGMP(v2, v3), MLD(v1, v2) & snooping, ARP inspection.
- Carrier Ethernet features
  - PB, PBB, PBB-TE
  - ELINE, ELAN, ETREE service.
  - OAM & protection switching.
- Security.
  - MAC based authentication.
  - Port based, single & multiple IEEE 802.1x.
  - Network Access Server.
  - ACL, Storm protection, AAA (RADIUS/TACACS+).
  - IP Source guard & MAC binding.
- QoS.
  - Traffic prioritization (802.1p)
  - Policers: port, service, queue & global/ACL, storm policing.
  - Priority: Port, User, input.
- Protection.
  - 1:1, 1:n port protection.
  - Ethernet Ring Protection.
- Monitoring
  - Port Mirroring/Flow mirroring.
  - RMON .
  - Sflow .
- Management
  - Industrial CLI – console port & telnet.
  - SSH, SCP, SNMP v3.
  - GUI interface via HTTPS.

Layer-2 Switch Features

Layer-2 switching features.
- Supports standard IEEE 802.1D STP, IEEE802.1s Rapid STP for faster convergence, IEEE 8-02.1s Multiple STP.
- 802.1Q VLAN switch with 32K MACs & 4K VLANs.
- Push/pop/translate up to 2 VLAN tags on ingress and/or egress.
- VLAN learning: Independent VLAN learning (IVL) and Shared VLAN learning (SVL).
- Hardware and Software based Learning.
- 512 TCAM based QoS, VLAN and Security profile classification entries.
- Voice VLAN.

Carrier Ethernet features.
- Can act as Provider Bridge (PB) switch with 32K MACs and 4K VLANs.
- Can act as Provider Backbone Bridge (PBB)/Customer backbone switch. [16K B-MACs & 4K B-VLANs (Backbone MACs/Backbone VLANS, 16K C-MACs, 4K VLANs (customer MACs/customer Edge VLANs), 4K MAC-in-MAC encapsulations]
- PBB-TE (with 4K Ethernet switched Paths (ESP) & 512 hardware protected ESPs].
- Synchronous Ethernet (SyncE) & L2 IEEE1588 time stamping hardware.
- Performance monitoring & OAM hardware for 4K service points, 512 paths, 32 ports.
- ELINE, ELAN & ETREE MEF services.

QoS.
- Traffic classes (8 active priorities).
- Policers: port, service3, queue and global/ACL.
- Port and queue egress shaper.
- Port default priority.
- User Priority.
- Input Priority mapping.
- Storm Policing.
- Weighted Random Early Detection (WRED).

Security.
- Network Access Server (NAS), ACL for filtering, policing and port copy, Port-based IEEE 802.1x, Single and multiple IEEE 802.1x, MAC based authentication, Guest VLAN, VLAN & QoS assignment, RADIUS account, MAC address limit, Web and CLI authentication, Authorization (15 user levels), IP source guard, IP MAC binding & IP MAC binding dynamic to static.

Management.
- Secure management access via CLI, GUI or MIB through SSH, HTTP server, SNMPv3 respectively.
- CLI – serial console port and telnet.
- Management access filtering HTTPs.
- Software upload through web.
- DNS client /Proxy.
- IPv6 Management.
- IEEE 802.10AB LLDP (Link Layer Discovery Protocol) & LLDP-MED (Media Endpoint Discovery) with discovery filtering.
- Loop detection/restore to default.
- Daylight savings.

Product Performance Parameters
- L2 switching   : System switching capacity of 52 Gbps with MAC table size of 32K, 1K layer 2 multicast port masks
- L3 routing   : 128 router legs with 4K IPv4/1K ipv6 IP unicast routes and 1K multicast router leg masks.
- QoS   : 32K queues with 4K Ingress & 8K Egress QOS mapping table entries & 512 security enforcement rules (ACL).
- Carrier Ethernet : 1K of 4 COS (Class of Services) & 512 of 8 COS bidirectional carrier ethernet connections (E-lines), 4K EVC bidirectional endpoints.