



EC CES Router Series ECR 1010 — *Tomorrow's Technology Today*

CARRIER ETHERNET SWITCH ROUTER SERIES

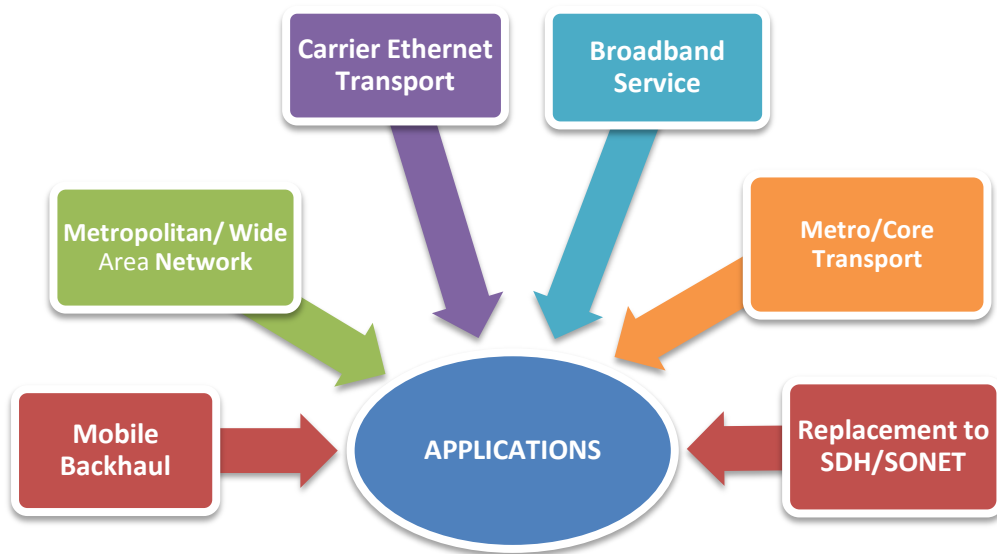
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ECR 1010



Electronics Corporation of India Limited

ECIL's ECR-1010 carrier Ethernet switch-routers offer next generation networking solution using Carrier Ethernet and Optical Transport Network and come from EC CES Router Series for core segment of transport network. Built with an innovative technology developed by the Gigabit Networking Laboratory (GNL) at IIT Bombay, these series of Transport Switches and Routers are poised to set new price/performance benchmarks in the telecommunication industry.



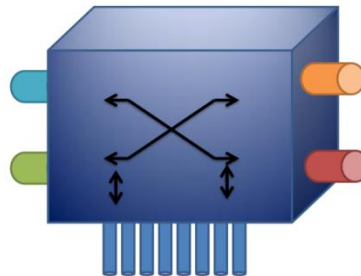
Technology

The path-breaking technology of ECR-1010 Series Switch Routers conceptualized at the Gigabit Networking Laboratory at IIT Bombay, collapses the lower three layers of the Internet protocol stack into a single layer. For backward compatibility with existing systems this transport switch/router uses the common denominator of Ethernet – while supporting carrier-class features and providing an ultra-fast routing fabric. The lower three layers of the OSI protocol stack – namely the network, data-link and physical layer are collapsed into a smart Carrier Ethernet layer that facilitates layer-2 service provisioning, routing and transport functionality. An additional support for Optical Transport Network capability enhances reach of this switch router to a distance of 1000 km without regeneration.

Networks with ECR-1010 Switch Router establish an end-to-end communication system that is based entirely on Ethernet - over fiber in the metro and copper in the local area network and facilitate support of services at the data layer. This ECR-1010 Switch Router solution takes into cognizance, network hierarchy and interconnection methodology in MANs/enterprises and advances in Carrier Ethernet technology (PBB-TE/MPLS-TP). This solution also provides an all Ethernet wide area

networking framework that involves a unique addressing and routing mechanism and leads to a scalable, hierarchical, easily upgradable, cost efficient and service-oriented transport network architecture. The network-wide requirements of emerging services especially video, mobile backhaul and data-center indicate a need to keep data in the lower layers—thereby conserving energy, lowering CAPEX and OPEX as well as providing better managed functionality.

- ❖ *Indigenous*
- ❖ *Ultrafast Router*
- ❖ *Carrier-Class Ethernet*
- ❖ *Low Latency*
- ❖ *Energy Efficiency*
- ❖ *Inherent Topological Security*



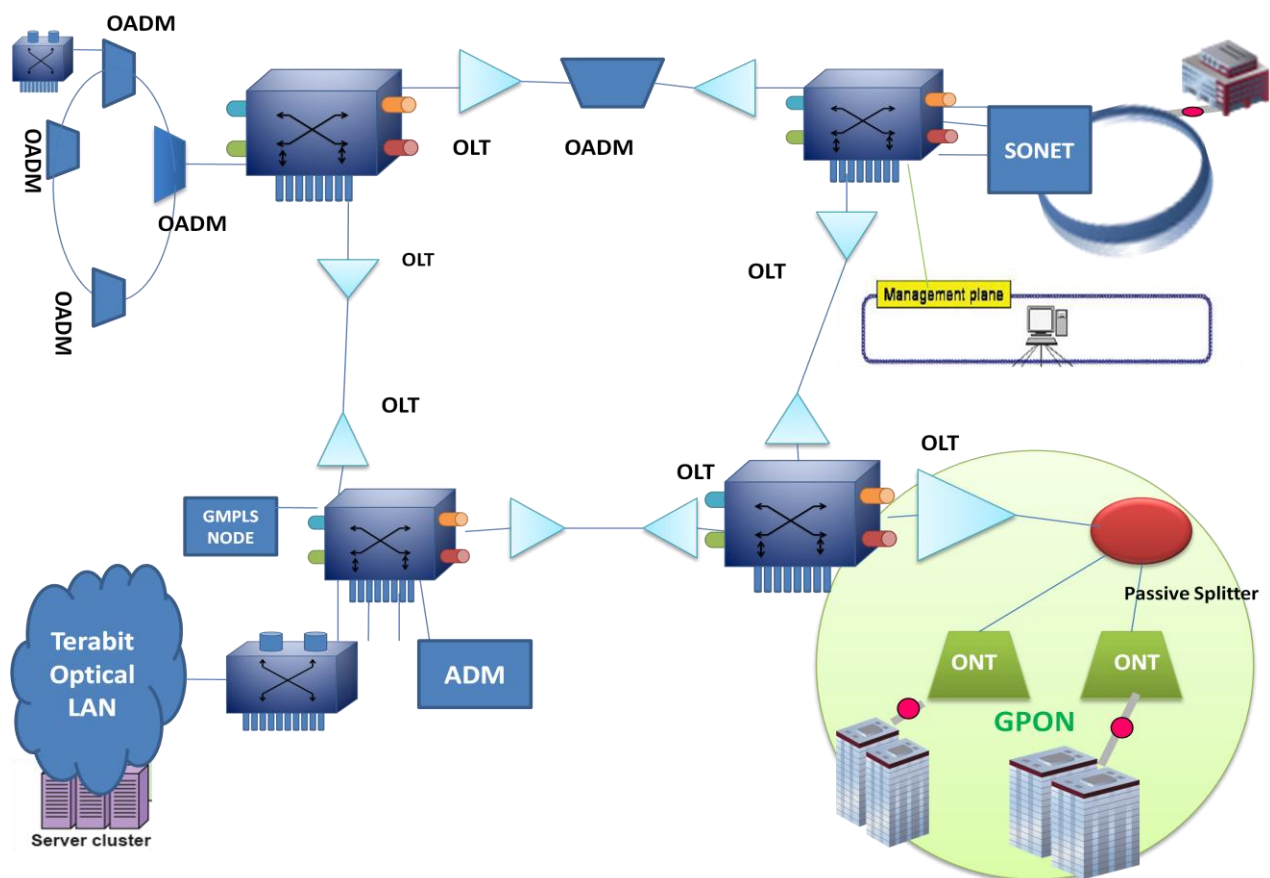
Benefits

The present version of the Internet with IP as the dominant network protocol, Ethernet as the MAC protocol and WDM at the physical layer is not cost and performance-wise efficient in meeting the challenges in emerging services particularly as energy sources plummet. With our proposed technology ECR-1010 Switch Router supports WDM fabric at layer 1 – hence facilitates excellent

fiber utilization and minimizes energy consumption. A proprietary yet compliant with standards, Carrier Ethernet based routing mechanism of ECR – 1010 Switch Router facilitates routing in a domain that supports end-to-end communication scheme with low cost, low energy consumption, low latency and small footprint.

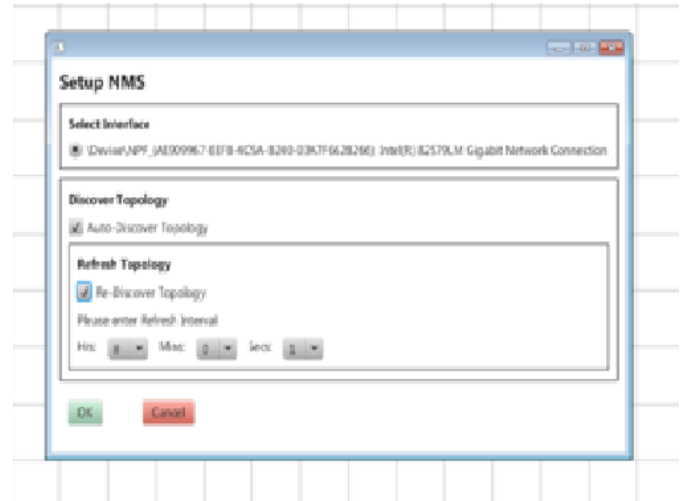
OTN support

The EC CES Router is an important tool towards the deployment of packet based transport networks. This CES Router uses G.709 OTN to provide a critical layer-1 infrastructural service that facilitates enhanced reach and wavelength-level OAM support. It can be said that OTN facilitates the true replication of SDH/SONET like behavior in the optical WDM network while allowing interfaces to support packet-mode granularity. The ECR 1010 supports two or four OTN ports at 10Gbps line-rate (OTU-2k/ODU2e). The support of OTN facilitates up to 1000 KM reach without regeneration of the optical signal – making this technology a possibility to connect the metropolitan cities in the country directly.



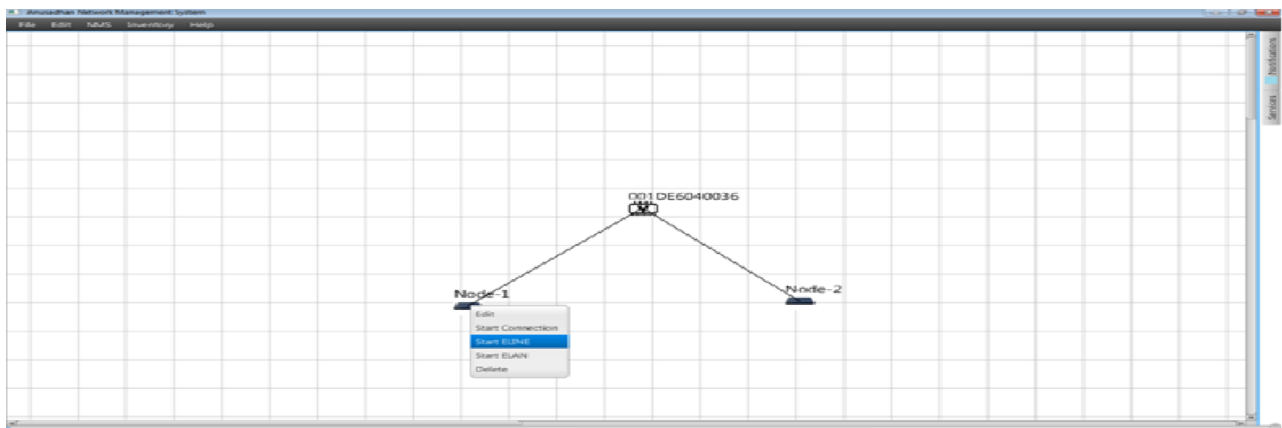
NMS – EC INOS

EC-INOS is the element management system for EC Routers. Topology discovery, routing and service provisioning in the network are the major tasks of EC – INOS. The INOS console is connected to one of the EC router in the network through the management port of the router. EC –INOS can detect up to 2000 ECR's interconnected in a network.

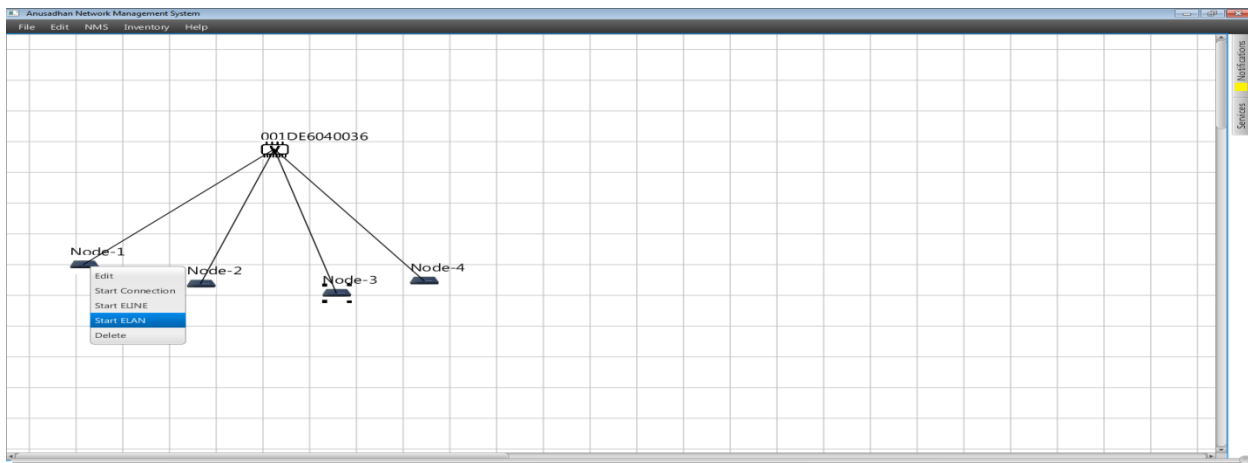


Service Configuration

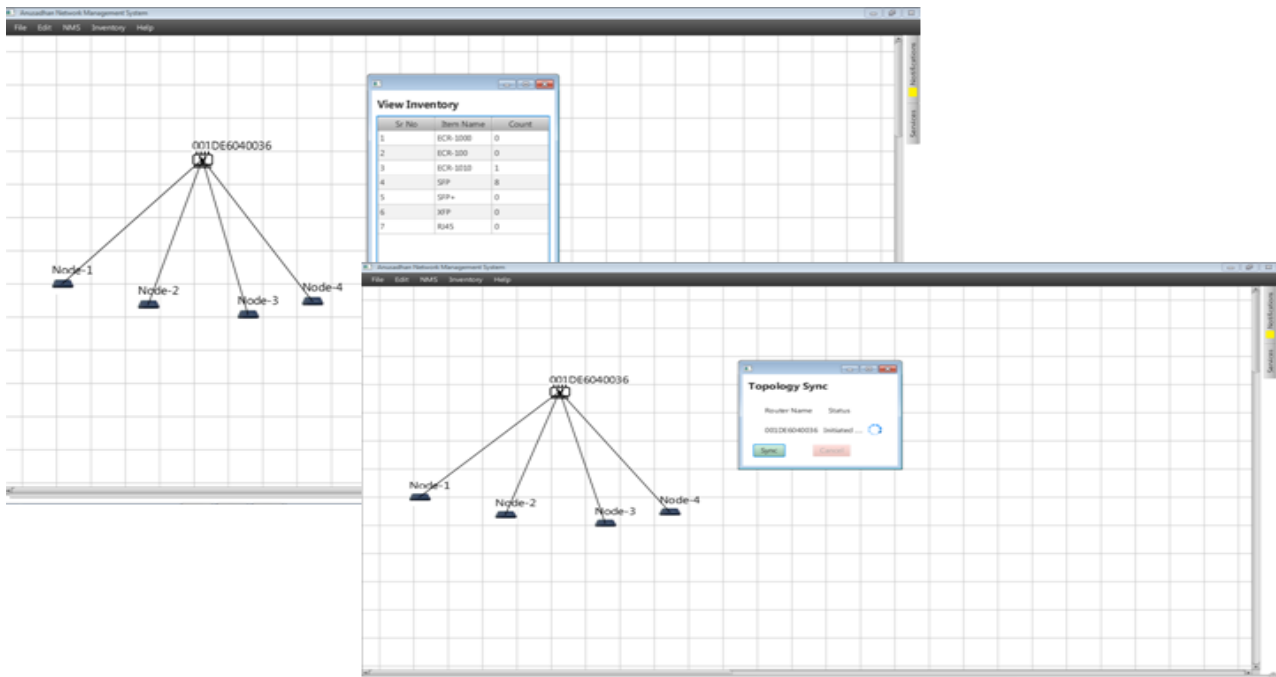
E-Line Service Allocation: Through EC INOS an E-Line service is characterized by two end-points and the rate of traffic is provisioned between these end-points. Every E-Line service is provisioned in conjunction with a geographically disjoint protection path to ensure reliability. The NMS selects the shortest path as the work path, and the next shortest disjoint path as the protection path.



E-LAN Service Allocation: Through EC INOS provisioning of an E-LAN service request is accomplished in finding a minimum spanning tree instead of a single path. A modified version of the Minimum Spanning Tree Algorithm has been implemented to meet the E-LAN provisioning requirements. In this, the algorithm creates two distinct spanning trees having maximum number of disjoint edges as well as nodes– one for work and the other for protection.



EC INOS SNAP SHOTS



ECR 1010 in Backbone Networks

With the ability to statistically multiplex traffic streams and provide for meeting dynamic bandwidth requests, Carrier Ethernet based systems reduce TCO in service provider's network. Integrating Carrier Ethernet systems with the optical network would further facilitate meeting provider needs. To fulfil this demand, the optical transport network (OTN) provides a good adaptation layer between Carrier Ethernet interface and the ROADM based WDM network. OTN also facilitates tandem channel monitoring (TCM) that leads to multi-domain provisioning and tracking of flows in a network as well as facilitates enhanced forward error correction (FEC), thus making the packet-oriented Carrier Ethernet (CE) technology migrate to regional and national backbones.

SPECIFICATIONS : ECR 1010

ECR 1010 is a 1-RU compact unit that performs 96 Gbps switching, routing and optical transport.

- Compatible interfaces such as 1GE Copper PHY, 1GE Fiber PHY and 10GE Fiber PHY.
 - o NMS port.
 - o 8 x 1 Gbps client interfaces.
 - o 4 x 10 Gbps network interfaces.
- Robust proprietary routing and switching mechanism.
 - o 96 Gbps non-blocking switching and routing fabric.
- Software Defined Networking like Compatibility supporting IPv4, IPv6, CTAG, STAG, and Port based identifiers.
- Compatible with legacy/current transport technology.
 - o 70 Watts power consumption.
 - o 0-50 degrees operating temperature.
 - o Redundant and hot swappable power supply.

Functional Specifications

- Performs transport (layer 1), switching (layer 2), forwarding (layer 2.5), routing (layer 3) in a single fabric.

- 1/25th the foot-print of available systems.
- Energy Consumption of max 70W for 96 Gbps switching and routing fabric.
- Physical layer: GigE, 10/100FE, 10GigE, OTN, ODU, ODU-flex, WDM, CWDM, PON
- OTN: ODU0, ODU1, ODU2 and ODU-Flex.
- MAC Layer: 802.3ae, 802.3z

Security

- Inherent topological security – first time ever.
- Cryptographic Authentication within 802.1x
- Connectivity Faulty Management: provides up to 20ms restoration.

Performance

- Natural multicast support.
- Cut-through and store-and-forward support.
- Intrinsic control plane for routing support.

Managed Services

- Layer 1 managed wavelength support.
- Layer 2 managed ESP support.
- Layer 3 managed LSP support.
- Managed bidirectional link support.
- Managed multicast session with granularity lock.
- Tunnel sizing support at layer 2 and layer 3.

NMS

- Point and click operation for service provisioning.
- Multicast group support.
- Number of multicast groups supported: 256 per router
- QoS supported: 4 levels.
- RJ45 interface.
- Up to 5 Mbps.
- Scalable up to 2000 nodes.

Power

- 230V AC / 48V DC
- 150W max rating.

Conformance

- EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide.
- EMC: FCC Part 15 Class A (USA).
- GR-63-Core: NEBS, Physical Protection.
- EN 61000-3-2 Power Line Harmonics.
- EN 61000-3-3 Voltage Fluctuations and Flicker.
- EN 61000-4-2 ESD.
- EN 61000-4-3 Radiated Immunity.
- EN 61000-4-5 Surge

Layer 1 protocol support

- 4x10GigE or 4xODU2 OTN G.709.
- 8x1GigE.
- Client side GigE or ODU0.
- C-band 50 GHz and 100 GHz spacing.(O1100 module).
- L-band 50 GHz and 100 GHz spacing. (O1100 module)
- Support for burst mode optics (client).

Layer 2: Data Link support

- Carrier Ethernet Support.
- IEEE802.1Qay. support/Scalable to meet RFC 5317/5921/5654/5860 MPLS-TP.
- IEEE802.1ag Ethernet Connectivity Fault Management (CFM) support.
- ITU.T. Y.1731 compliant.
- ELINE and ELAN support.

- BGP emulation for Inter-domain communication. (optional feature)
- IGMP group multicast support.
- L3 VPN support.
- L3 port queue: 20 MB (megabyte).

Layer 3: Routing Specification

- 1 microsecond port to port routing for up to 50% load.
- <3 microseconds for 50-75% load.
- <9 microseconds for full load.
- 1000 unique entries for FEC for each port.
- Intra-domain routing support.
- IPv4 and IPv6 support.

Hardware Specification

- Box size: 1 RU
- Depth: 452.2mm
- Height: 44.4mm
- Width: 482mm
- Humidity: up to 80%
- Weight : 5.5 kgs

Hardware Security

- Single FPGA based.
- Control plane: integrated with NMS and EMS support.
- Memory to ASIC: ECC based
- Granularity 1 Mbps to 10 Gbps in increments of 1 Mbps.

For further information please contact:

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