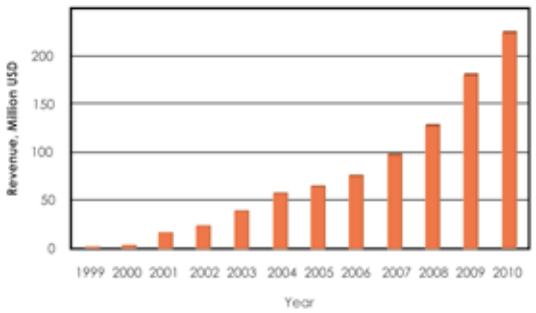
RAISECOM

Product Catalog 2011

The Company – A Brief History

Since its founding in 1999, Raisecom Technology has established its reputation as a top global equipment provider of innovative last-mile access and aggregation solutions in the telecommunications market. Initial Raisecom products for the carrier market were an innovative highly reliable product line of Ethernet copper to fiber media converters. Rapidly we gained credibility and major market share in countries around the world. We continue to build on our reputation for developing high-quality Carrier Ethernet and access products. We have won and continue to win numerous industry awards and are recognized as a market leader. Raisecom has grown to over a 2100 employees with annual revenue exceeding $220 million. Raisecom's growth is due to our ability to design and manufacture high quality broadband products and provide our customers with exceptional support.



Well over half of the company's revenue is invested in engineering and product development. We offer a standards based diversified and growing product line including Carrier Ethernet over fiber/PDH/SDH/G.SHDSL products, PDH/SDH multiplexers, CWDM systems, L2 Ethernet Switches as well as residential and enterprise access gateways. With over 8 million units installed in service provider networks Raisecom has addressed the most discriminating customer requirements for performance, synchronization, cost reduction, and network operations.

Raisecom has achieved 40% revenue growth every year since its inception; and, has been recognized by Deloitte Touche Tohmatsu as one of the 500 Fastest Growth Technology Companies in the Asia Pacific market for four years in a row. With headquarters is Beijing, Raisecom has expanded its operations to include Europe, Latin America, , Canada, Middle East, Southeast Asia, and the United States.

Raisecom is ISO9001:2000 certification for R&D, Production, Technical Support and Marketing. Products are CE, RoHS, WEEE, UL, and CSA certified. Raisecom is an MEF member and its Ethernet product lines adhere to MEF recommendations. Raisecom is a strong advocate of industry standards and vendor interoperability. Raisecom participates in the world's most important telecom fairs and exhibitions every year, such as CeBIT, Sviaz EXPO, PT EXPO, Convergence India, CommunicAsia, as well as numerous regional events. We welcome the opportunity to work with customers and partners contributing to your success.

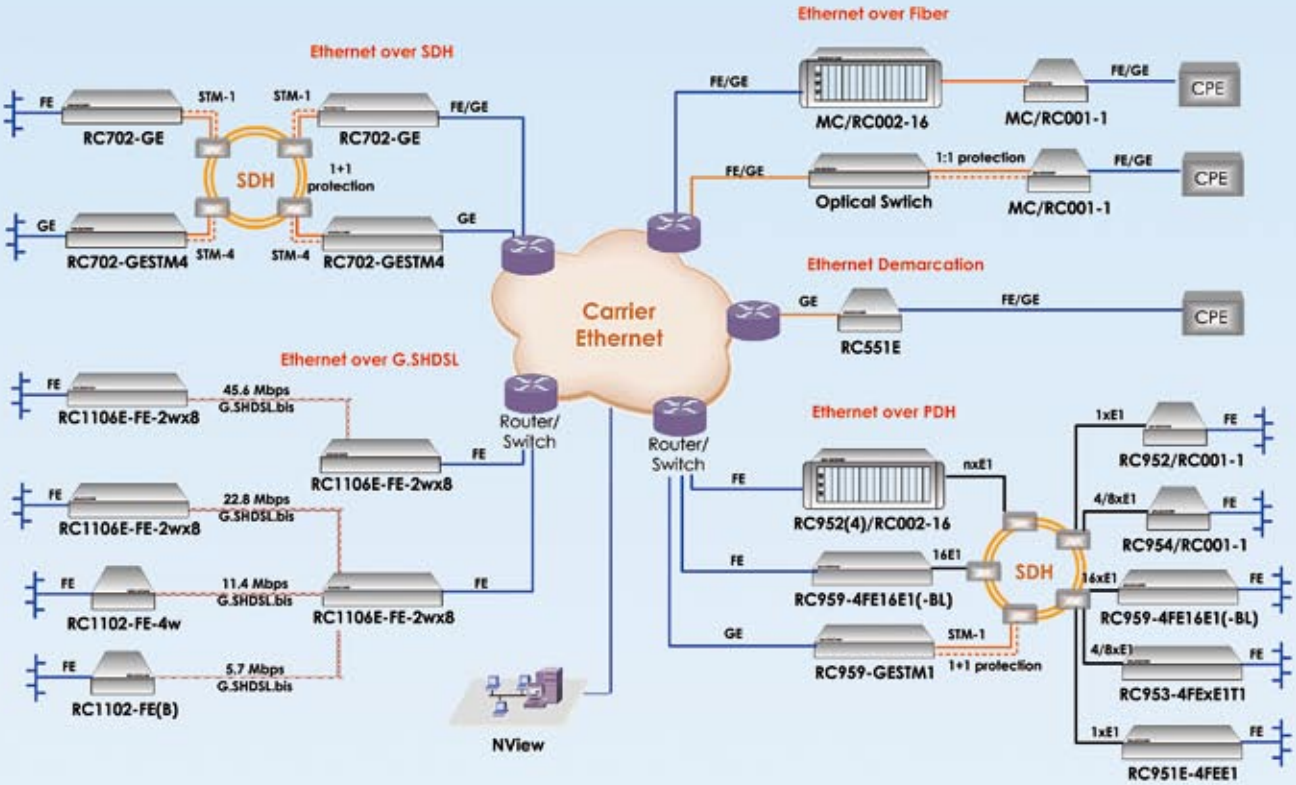
Table of Contents

Chapter 1 - Carrier Ethernet Demarcation

Ethernet is the dominant technology for Local Area Networks (LANs). Due to its inherent efficiencies it is now being widely deployed in metropolitan and Wide Area Networks (WANs). This trend will continue due to increased bandwidth requirements, convergence, migration to 4G networks and triple play services.

By working with world major carriers, utilizing our industry expertise and committing significant resources, Raisecom has developed a set of Ethernet access technologies to deliver Carrier Ethernet services over existing network infrastructures, such as traditional TDM networks, dark fiber and twisted pairs.

Our focus has been on facilitating a seamless and cost effective migration from traditional networks to packet switching technology. As an example, our standalone Ethernet Demarcation Device RC551E is a media converter designed with complete layer-2 Ethernet switching function including advanced Ethernet connection check technologies: IEEE802.3ah, IEEE802.1ag and ITU-T Y.1731. Similar solutions are provided in Raisecom's Ethernet over PDH and Ethernet over G.SHDSL product lines. Raisecom access devices enable service providers to have full OAM capabilities to effectively deploy and support new services and managed SLA compliance.



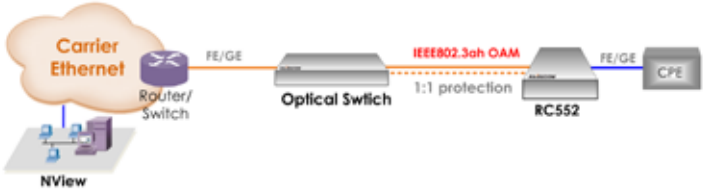
RC552

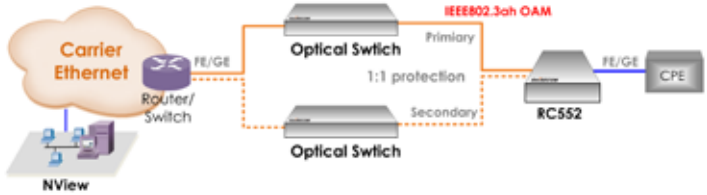
RC552-FE (Rev.B)
RC552-GE (Rev.D)

OAM Media Converter with 1:1 Uplink Protection

- RC552-FE(Rev.B) has two slots for 100Base-FX SFPs and one 10/100Base-T RJ-45 port at Client side.
- RC552-GE(Rev.D) has two slots for 1000Base-X SFPs and one 10/100/1000Base-T RJ-45 port at Client side.
- Certified EPL services compliant with MEF9 and MEF14 standards
- 1:1 uplink protection, switching in less than 50ms
- Front panel LED fault and status indicators
- User configurable Line-to-Client and Client-to-Line fault pass through
- User configurable rate limit
- VLAN, Q-in-Q, CoS value remark
- Modular design, power supplied in Raisecom RC002 series chassis
- Web management for single module, including firmware upgrades
- Local and remote management via SNMP GUI of NView Network Node Management (NNM) system

RC552 deployed in pairs to extend Fast/Gigabit Ethernet over fiber





RC552 directly connected to optical switch implementing port-level and system-level dual-homing

RC552-FE(Rev.B) and RC552-GE(Rev.D) continue the modular design of Raisecom media converters and the OAM features of RC552 series. Fiber uplink protection, layer-2 switching functions and web management makes the media converter a powerful Ethernet access device in a carrier's network supporting multi-service access.

Carriers are building networks with redundant service channels to provide high-reliability. The RC552-FE/GE with 1:1 uplink protection meets a carrier's dual-homing architecture both on port level and system level.

Similar to Raisecom's traditional media converters for point-to-point applications and centralized network management, there are advantages when customers choose RC552-FE(Rev.B) or RC552-GE(Rev.D) to support Ethernet services. They can be managed by the GUI of Raisecom NView NNM system when they are installed in the Raisecom RC002 series chassis with an SNMP agent. Moreover, with the web-based management function, remote site trouble-shooting and maintenance is simplified.

RC551E Series

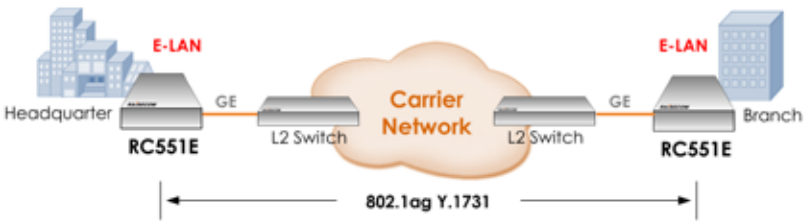
RC551E Series

Intelligent Ethernet Demarcation Device

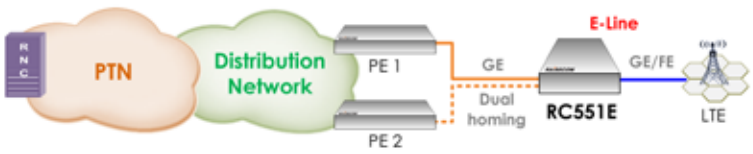
- EPL, EVPL for enterprise customers to replace legacy TDM leased line service
- Backhaul for IP DSLAM, WiMAX base station
- Generate revenues with competitive Ethernet solution for CLEC
- Integrated traffic generator makes throughput test to be implemented easily
- Non-intrusive Loopback based on Source/Destination MAC address, Client/Service
- VLAN stacking, CoS rewriting and rate limiting
- Uplinks redundancy and resiliency complied with G.8032/1
- Web, SNMP, 802.3ah, 802.1ag, Y.1731 OAM
- Layer-2/3 SLA (Frame delay, jitter & packet loss)

Raisecom RC551E series is Ethernet Demarcation Device (EDD) which serves on border located at the customer premises and owned by the service provider. EDD delivers premium EPL, EVPL, E-Line, E-LAN and E-Tree services for carriers and also could deliver managed converged services (voice, video and data) over VLAN in an access network or a metro Ethernet network, which offers both carriers and customers guaranteed and committed Ethernet services.

EDD is separated by 2 parts one of which is NID and the other is UNI. This was defined by MEF and EDD is becoming a standard device on customer premises when carrier Ethernet service is popular and dominant. On the NID side, EDD focuses and supports all the protocol for resiliency and redundancy, management, fault diagnostics and isolation as well as performance management. Industrial standards 802.3ah, 8021.ag and Y.1731 make Ethernet OAM to perform well and possible to interoperate each other. But, performance management is only depending on some small frames connectivity testing and loopback. RAISECOM integrated traffic generator into EDD to make non-intrusive throughput testing to be implemented based each service or subscriber easily. Operators could perform it according to the requirements from 15 minutes to 24 hours on site. This is the key to make EDD possible to be alternative solution TDM CSU/DSU. UNI is facing towards customers and supports more advanced QoS, security, service differentiation, ACL, etc.



Enterprise E-LAN services



4G/LTE mobile backhaul

RC951E-4FEE1
RC953-4FExE1T1

RC951E-4FEE1
RC953-4FExE1T1

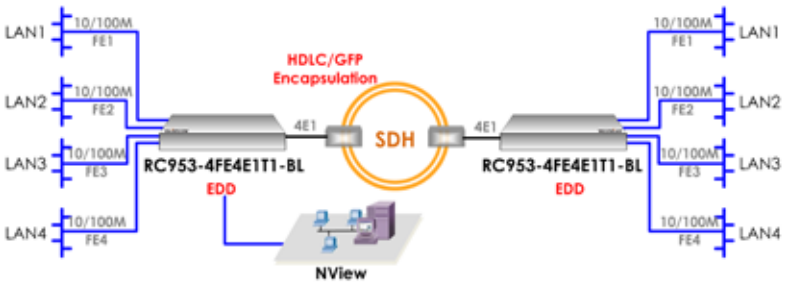
Ethernet over PDH Remote Gateway

- Available with 1/4/8 E1 uplinks, 4 FE user ports
- Single VCG, HDLC/GFP encapsulation software configurable
- VCG-level fault pass through, E1 link diagnostics
- Ingress rate limit, egress traffic shaping, and storm control
- VLAN tagging and stacking, CoS/DSCP/port-based QoS
- IEEE802.3ah OAM, IEEE802.1ag CFM, and ITU-T recommendation Y.1731
- CLI management access by local CONSOLE, Telnet or SSH
- In-band web-based management
- GUI-based centralized management on Raisecom NView NNM system

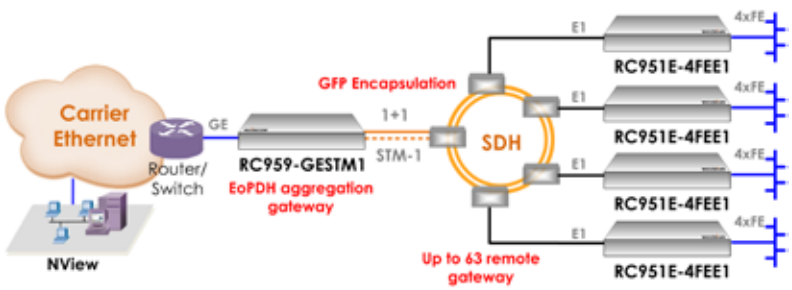
Raisecom RC951E-4FEE1 and RC953-4FExE1T1 are intelligent Ethernet Demarcation Devices (EDD) with E1 uplinks. The RC951E-4FEE1 offers 4 FE downlink ports and 1 E1 uplink, the RC953-4FExE1T1 series offer 4 FE downlink ports and 4/8 E1 uplinks. A customized Ethernet service channel can be provisioned over carrier owned PDH network when a pair of these devices are deployed in a point-to-point configuration, or when one is deployed with an EoPDH aggregation gateway. The support of HDLC and GFP encapsulation allows the RC951E-4FEE1 and the RC953-4FExE1T1 series to be able to work with both RC953E series and RC959 series aggregation gateways.

A Raisecom EDD is not only capable of functioning as a layer-2 switch, but also supports network diagnostics as an edge device. The support of IEEE802.3ah, IEEE802.1ag and ITU-T Y.1731 can meet carrier's OAM requirements on edge devices.

In addition to CLI management, RC951E-4FEE1 and RC953-4FExE1T1 series are available with in-band web-based management, and can further be monitored and managed via the GUI of Raisecom NView NNM system.



Point-to-point application of Ethernet Demarcation Devices with E1 uplinks



Working in point-to-multipoint topology with an EoPDH aggregation gateway

RC959-4FE16E1(-BL)

RC959-4FE16E1(-BL)

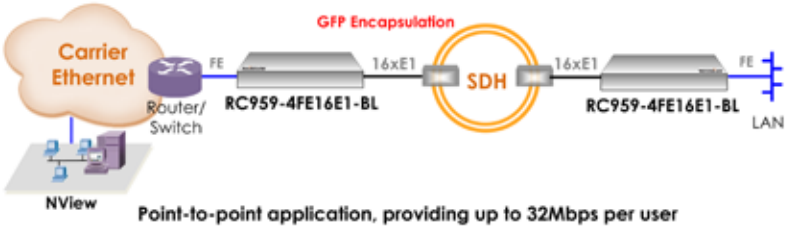
Ethernet over PDH Aggregation Gateway/ Remote Gateway

- Fast Ethernet over 16 E1 circuits, 4 10/100Base-T user ports, 1 GE combo port
- Standard GFP encapsulation, VCAT, and LCAS
- 16 VCG supported, maximum of 16 E1 members in one VCG
- VCG-level fault pass through, E1 link diagnostics
- Real-time E1 port, VCG, GE port, STM-1 port statistics and error status monitoring
- Ingress rate limit, egress traffic shaping, and storm control
- VLAN tagging and stacking, CoS/DSCP/port-based QoS
- IEEE802.3ah OAM, IEEE802.1ag CFM, and ITU-T recommendation Y.1731
- CLI management access by local CONSOLE, Telnet or SSH
- In-band web-based management
- GUI-based centralized management via Raisecom NView NNM system

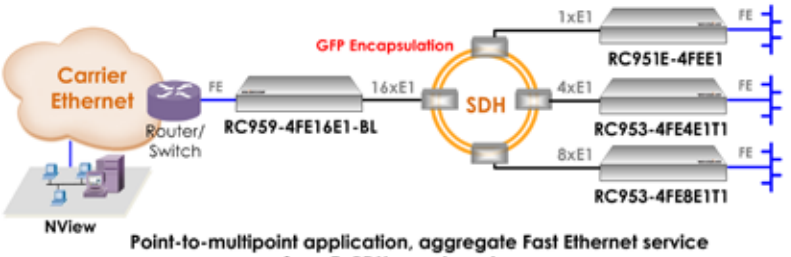
RC959-4FE16E1(-BL) is designed following the standard GFP encapsulation. One of the typical applications of this device is point to point deployment. The device is also an EoPDH aggregator that can aggregate Ethernet services from remote gateways, including Raisecom RC951E-4FEE1 and RC953-4FExE1T1 series. Another application is as an EoPDH remote gateway working with larger-capacity EoPDH aggregation gateways such as the Raisecom RC959-GESTM1, meeting high bandwidth requirements of customers.

As an aggregation device for Ethernet services, the RC959-4FE16E1(-BL) supports layer-2 Ethernet switching, but also meets IEEE802.3ah, IEEE802.1ag and ITU-T Y.1731 OAM requirements.

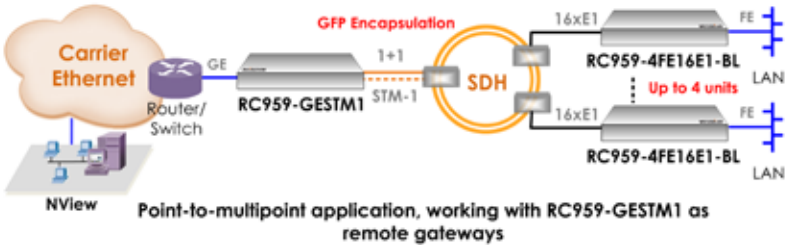
RC959-4FE16E1(-BL) diagnostic tools include local and remote E1 loopback, E1 BER testing, loopback detection, etc. In addition to local CLI management, the device is also available with in-band web-based management, and can be configured and monitored via the GUI of Raisecom NView NNM system.



Point-to-point application, providing up to 32Mbps per user



Point-to-multipoint application, aggregate Fast Ethernet service from EoPDH remote gateways



Point-to-multipoint application, working with RC959-GESTM1 as remote gateways

RC959-GESTM1

RC959-GESTM1

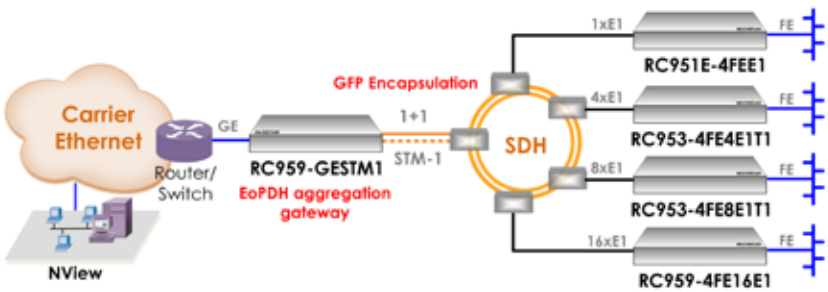
Ethernet over PDH Aggregation Gateway

- Gigabit Ethernet over channelized STM-1, 2 combo Gigabit Ethernet user ports, 2 STM-1 ports working in 1+1 protection
- Standard GFP encapsulation, VCAT, and LCAS
- 63 VCG supported, maximum 16 E1 members in one VCG
- Aggregate Ethernet traffic from up to 63 remote gateways
- VCG-level fault pass through, E1 link diagnostics
- Real-time E1 port, VCG, GE port, STM-1 port statistics and error status monitoring
- Ingress rate limit, egress traffic shaping, and storm control
- VLAN tagging and stacking, CoS/DSCP/port-based QoS
- IEEE802.3ah OAM, IEEE802.1ag CFM, and ITU-T recommendation Y.1731
- CLI management access by local CONSOLE, Telnet or SSH
- In-band web-based management
- GUI-based centralized management via Raisecom NView NNM system

The RC959-GESTM1 is a GFP-encapsulation EoPDH aggregation gateway that connects Ethernet over existing SDH networks enabling carriers to offer customized Ethernet service. The device supports multiple VCGs and allows service providers to access multiple users and provision bandwidth from 2Mbps to 32Mbps. Standard LCAS keeps the service channel up when network problems exist.

Typically, the RC959-GESTM1 is deployed at the service provider POP, aggregating Ethernet services from remote gateways such as Raisecom RC951E-4FEE1, RC953-4FExE1T1 series and RC959-4FE16E1(-BL). As an aggregation device for Ethernet service, the RC959-GESTM1 provides both layer-2 Ethernet switching and network diagnostics. It is equipped with Ethernet connection diagnostics tools: IEEE802.3ah, IEEE802.1ag and ITU-T Y.1731.

RC959-GESTM1 diagnostic tools include local and remote E1 loopback, E1 BER testing and loopback detection. In addition to local CLI management, the device is also available with in-band web-based management, and can be configured and monitored in a centralized way via the GUI of Raisecom's NView NNM system.



Aggregate Ethernet services from 2Mbps up to 32Mbps from different Raisecom EoPDH remote gateways

RC702-GE
RC702-GESTM4

RC702-GE
RC702-GESTM4
Gigabit Ethernet over SDH STM-1/STM-4

- Connects Gigabit Ethernet over SDH STM-1/STM-4 circuits
- RC702-GESTM4 can aggregate up to 8 Fast Ethernet over two STM-4 circuits
- Modular design of Ethernet sub-cards and STM-1 sub-cards, flexible Ethernet over SDH solutions
- Fault pass through from SDH line side to user Ethernet interface
- Support VC12/VC3/VC4 mapping
- Support VC12/VC3 VCAT (ITU G.7043) and LCAS (ITU G.7042)
- Support standard encapsulation with GFP (ITU G.8040) and LAPS (ITU X.86)
- End-to-end performance test and near-end/far-end fault alarms
- Redundant hot-swappable power supply
- SNMP management via the GUI of Raisecom NView NNM system

RC702 series devices are network termination units connecting Gigabit Ethernet network over protected SDH STM-1 or STM-4 circuits, the RC702-GESTM4 can aggregate up to 8 Fast Ethernet across SDH circuits. The devices are widely used to provide leased line services for enterprise, government, utilities and railway customers. They are also cost-efficient solutions for IP DSLAM backhaul and wireless/WiMAX backhaul.

RC702 series devices have a modular design offering flexibility in deployment. The RC702-GE is available with different Ethernet sub-cards options, and STM-1 uplink card options. RC702-GESTM4 has different Gigabit Ethernet extension cards for cost-effective solution, SLA assured solution, and Ethernet service aggregation solution.

The RC702 series can be managed via the GUI of Raisecom NView NNM system. Both local and remote units can be fully monitored and managed on the uniform platform. In-band remote management is available when using a sub-card with in-band management channel, which help users save IP address resources for management.

Delivering point-to-point Ethernet services over STM-1/STM-4 circuits with 1+1 protection

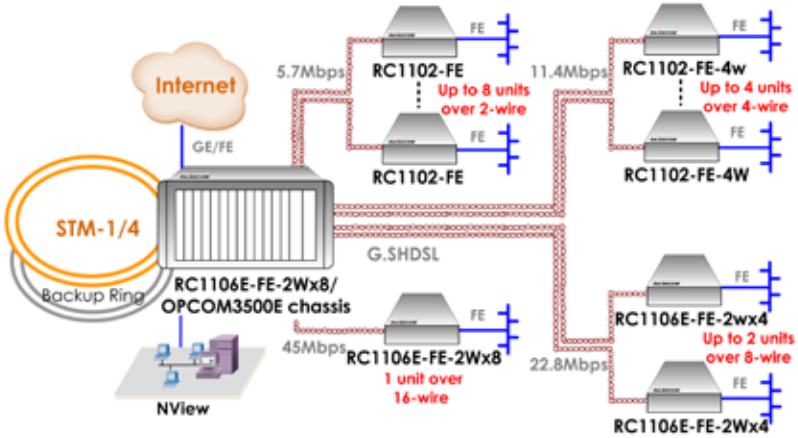
Aggregates 8 Fast Ethernet to Gigabit Ethernet over two STM-4 links

RC1106E-FE-2W×8

RC1106E-FE-2Wx8
RC1106E-FE-2Wx4
G.SHDSL.bis Demarcation Device

- Complies with enhanced SHDSL ITU-TG.991.2 and TC-PAM32
- P-to-P and P-to-MP application on existing copper lines
- EFM bonding 5.7Mbps for each pair and up to 45.6Mbps on 8 pairs
- Support built-in BERT for line tests
- MTU up to 1,632 Bytes
- Rate limiting at 64k (64k-1M) and 1M (1M-100M) granularity
- 4K active VLAN and Q-in-Q
- Support QoS and SLA functions
- IEEE 802.3ah, 802.1ag, and ITU-T Y.1731 OAM
- DHCP Snooping & Option 82
- Local/remote MGT via console/web/SNMP

Delivering Fast Ethernet services over 16 wire copper cables



Aggregation fast Ethernet services to one GE/FE over cooper wire

RC1106E-FE is an intelligent G.SHDSL. bis demarcation device which can be used in point-to-point and aggregation applications. In a PTP application it offers up to 45.6Mbps Ethernet throughput over 16-wire (8-pair) copper pairs by EFM bonding; it can be deployed as an aggregation device to concentrate 2/4/8-wire traffics from multiple remote sites. As a member of Raisecom's Ethernet Demarcation Device portfolio, RC1106E supports integrated VLAN, Q-in-Q, QoS, rate limiting and 802.3ah, 802.1ag and Y.1731.

RC1106E-FE-2Wx8 card is designed to be deployed in OPCOM3500E 3U/6U or RC006-1 1unit high chassis. It offers two options for connecting the Ethernet traffic, through the card's front panel or aggregated into OPCOM3500E's Gigabit Ethernet uplink to the PSN backbone. It supports local CLI and SNMP based management via the MGT Agent card in chassis and independent remote SNMP management through the Ethernet interface. When working in aggregation application, it supports Raisecom RC1102-FE(Rev.B), RC1102-FE-4W, RC1106E-FE-2Wx4 and RC1106E-FE-2Wx8 as remote peers.

MSG2200

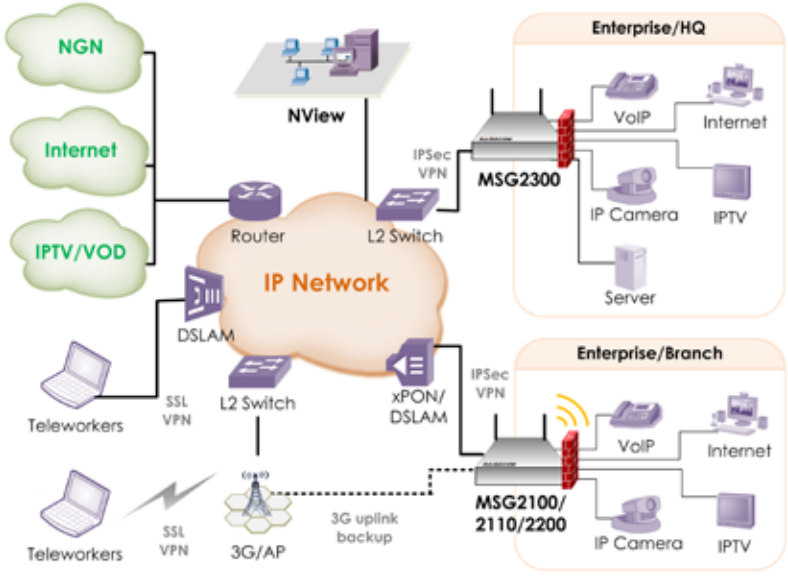
MSG2100/2200/2110-SHDSL

SME Gateway
VPN Router

- Provide 4/8 Fast Ethernet ports at client side
- Provide 2/4/8 FXS ports over any broadband Internet connection with SIP optionally
- Provide flexible uplink options including G.SHDSL.bis, FE/GE(electrical/optical), EPON and
- 3G WCDMA/EVDO
- Support IEEE802.1q, 802.1ad (Q-in-Q), 802.1p and TOS/Diff-serv
- Support static/dynamic routing (RIP) as well as OSPF
- Support NAT/NAPT, DHCP and DNS/DDNS
- Support Firewall, Content Filtering, Anti-DoS and Anti-ARP
- Support IPSec, SSL and L2TP VPN
- Support IEEE 802.11b/g/n connection optionally
- Support EFM bonding up to 4 wires G.SHDSL and bandwidth up to 22.8Mbps
- Support IEEE 802.3ah EPON of single mode, single-strand, symmetric 1.25Gbps
- Management via Telnet, CLI, Web management, TR069, SNMP

Raisecom MSG2100/2200/2110-SHDSL series Enterprise Gateway aim at providing solutions satisfying requirements for SME scenarios, such as small/medium business, education institutes, hotels and hospitals. It offers flexible uplink options including bonded G.SHDSL.bis, FE/GE(electrical/optical), EPON and 3G WCDMA/EVDO wireless. MSG2100/2200/2110-SHDSL series are ideal for concurrent services with stringent performance requirements, such as firewall, content filtering, encryption for VPN and IEEE 802.11b/g/n. With advanced QoS features, it also helps to optimize VoIP and IP video applications at broadband speeds.

The particular series are featured with quick responses, prompt delivery, rapid networking deployment capabilities as well as resilient performance and great compatibility with multi-types of services. Meanwhile, it can greatly reduce both the equipment and management costs.



Broadband Internet access for small and medium-sized enterprises

Chapter 2 – Packet Transport Networks

New market requirements and trends have brought dramatic changes to transportation and access networks, especially in Mobile Backhaul application. Current GSM and other 2G mobile networks are using SDH/ATM links to provide the backhaul from BTS to BSC/MSC. However, as data service is taking more and more percentage in overall traffics in 3G/4G/LTE networks, the SDH/ATM is no longer suitable for future data-oriented transportation because increasing the transmission bandwidth can be considerably expensive comparing to mobile operators' revenue growth. Operators must have a cost-efficient way of increasing the bandwidth while keeping profitable.

As the Carrier Ethernet is evolving rapidly with a great number of new technologies, it is considered as the best way of providing mobile backhaul solutions for incoming 3G/4G/LTE networks. In order to keep consistency to traditional SDH/ATM based transport, many aspects in Carrier Ethernet are greatly improved and adapted, including network management and diagnostic capabilities, network resiliency and redundancy, circuit emulation as support to legacy voice services, and the most important network frequency and time synchronization which not exists previously in Ethernet technology.

Challenges	SDH/ATM	Carrier Ethernet
Delay and packet loss	Leased line	MPLS/MPLS-TP/T-MPLS VPN
Resilience and protection	MSP/SNCP	G.8032/8031, IEEE802.3ad with LACP, STP/RSTP/MSTP
Diagnostic	SDH OAM	802.3ah/802.1ag/Y.1731/Y.1711/embedded RFC2544
Security	Point to point connection	VLAN/PW Label/LSP tunnel
Time sensitivity service	Native	H-QoS/DiffServ
Synchronization & Synchronization hand over	Native for frequency synchronization But not available for phase synchronization	Synchronous Ethernet IEEE 1588v2 ITU G.8261/2 10MHz+1pps+ToD signals input and output
TDM service delivery	Native	SAToP/CESoP/TDMoMEF/TDMoMPLS, MEF8

These new add-ons have transform Carrier Ethernet to a transportation technology rather than Ethernet's LAN nature. With these technologies, mobile operators will be able to provide up to 1G and even 10G bandwidth to support ever-growing data services delivered in 3G/4G/LTE networks at reasonable cost.

iPN201

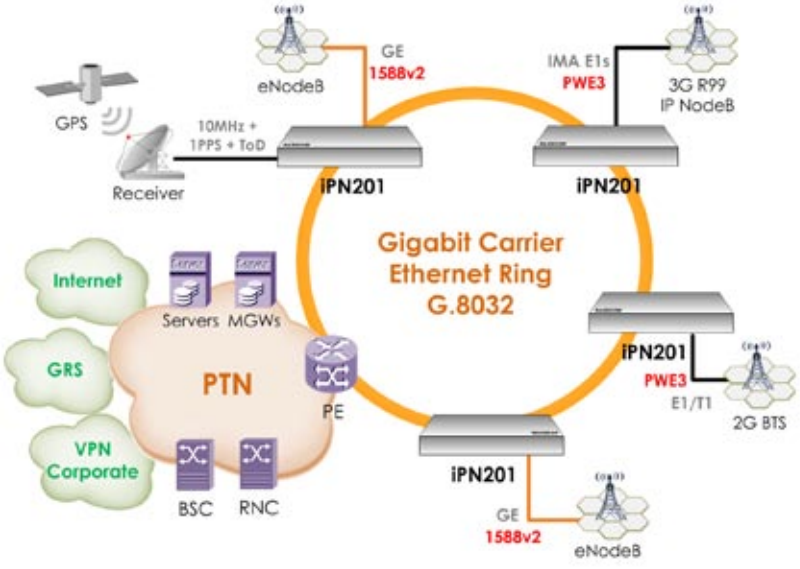
iPN201

PTN Access Node

- Fully modular design for every functional component
- All Gigabit Ethernet interfaces for Carrier Ethernet/MPLS-TP service delivery
- Carrier Ethernet E-Line/E-LAN/E-Tree services support
- 2 SFP-based line interfaces and 4 combo client interfaces with DDI function
- Support Circuit Emulation with SAToP and CESoPSN
- Ethernet Synchronization with IEEE 1588-2008 OC/BC/TC mode and SyncE
- Provide 2Mbps/2MHz/10MHz clock input/output interfaces
- ITU-T G.8031 ELPS and G.8032 ERPS for resiliency and redundancy
- IEEE802.3ah, 802.1ag and ITU-T Y.1731 standard OAM
- H-QoS and traffic policing/shaping provides SLA assurance
- Integrated traffic generator provides real-time throughput test for SLA
- Support Jumbo Frame up to 13K Bytes
- Bandwidth profile based on per port/EVC/CoS
- IEEE802.1Q, 802.1p and 802.1ad VLAN support
- Hot-swappable redundant power supply and fan modules
- Local and remote managed via console/Telnet/SSH/SNMP

The iPN201 is Raisecom's latest implementation of intelligent Carrier Ethernet/MPLS demarcation device. It is designed with 2 GbE network interfaces, 4 combo GbE client interfaces and two expansion slots for clock signal input/output and PWE3 interfaces respectively. It is highlighted with IEEE 1588-2008 and Synchronous Ethernet functions to provide Pulse Per Second and Time of Day (PPS+ToD) signals over Carrier Ethernet for 3G/4G/LTE Mobile Backhaul (MBH) application. Up to 8 E1/T1 interfaces are provided on PWE3 interface expansion card to connect legacy 2G BTS where E1/T1s are still dominant to carry voice traffic. While PPS+ToD input/output interfaces are provided on clock expansion card to support clock recovery for BTS/E-NodeBs in case that 1588v2 and SyncE protocols are not yet supported by the transportation network. 2Mbps/2MHz/10Mbps interfaces are provided to derive external clock synchronization from legacy E1 circuit or GPS.

H-QoS, rate limiting and traffic shaping, ingress/egress policing, standard OAM protocols such as 802.3ah Link OAM, 802.1ag and ITU-T Y.1731 CFM and integrated traffic generator test tools are provided to help service providers guarantee the SLA with business and VPN customers. The integrated traffic generator provides real-time throughput test that allows service providers to guarantee and demonstrate the provided link bandwidth at any time without interruption of customer traffic. Besides, iPN201 also provides standard G.8031 and G.8032 Ethernet protection technologies to strengthen the network's resiliency and robustness.



2G/3G/4G/LTE packet-based Mobile backhaul solutions

Chapter 3-Carrier Ethernet Switch

As world-leading metro Ethernet equipment vendor and member of the MEF (Metro Ethernet Forum), Raisecom provides both Ethernet aggregation and access switching devices (ISCOM series Ethernet switches) for Carrier Networks. Raisecom Carrier Ethernet aggregation and access switches are complementary and constitute complete carrier class Ethernet solutions.

Metro Ethernet is the primary Carrier network for multi-service applications. It can support Internet access, IPTV, VoIP, 3/4G mobile traffic and enterprise solutions.

The ISCOM product line offers feature-rich access/aggregation devices, which are designed to fully support all Service Provider's requirements and deliver a complete portfolio of voice, data and video services. The ISCOM family consists of a wide range of products including Metro access switches with 8 x 10/100Mbps ports + 2 GE SFP uplinks, 24 x 10/100Mbps copper ports + 2/4 GE SFP uplinks and a carrier aggregation switch with 24 x 100/1000Mpbs copper/optic ports + 4 GE SFP/2 10GE XFP uplinks.
ptic ports + 4 GE SFP/2 10GE XFP uplinks.

Security

ISCOM switches support the standard, extended access control lists, based on physical port, MAC, VLAN, IP, Layer-4 protocol numbers, the user can not only filter out viruses from the access layer, prevent spreading and impacting to the core device, but also can prevent ARP attacks, illegal DHCP attacks. In addition, Port isolation of the same VLAN ensures that the metro access network data communication security.

Bandwidth control

Support physical port-based bandwidth control, flow-based bandwidth control, effectively provides users the required quality of service. QoS mechanisms support priority queue. The user/service traffic type is assigned, according to each queue waiting for forwarding per port, 4/8 priority queues. The ingress/egress rate-limit can control the data rate in a certain range.

Traffic forwarding

Based on multicast forwarding table, IGMP Snooping transmits traffic to relevant ports while not forwarding to all, effectively saving switch bandwidth. MVR provides multicast copy function cross-VLANs minimizing uplink bandwidth requirements when supporting multicast services.
Through the use of standard/flexible QinQ function, ISCOM series can manage outer VLAN tag packets encapsulation/ decapsulation according to different users, applications, and priorities, in order to achieve flexibility in planning or deployment of the network and support multiple services.

Management

ISCOM series Carrier Ethernet Access/ Aggregation switches fully comply with IEEE802.3ah standard, OAM (discovery, dying gasp, fault propagation, remote loopback, critical events and MIB retrieval) and IEEE802.1ag CFM with end-to-end performance, continuity check, loopback and fault monitoring options. These advanced management protocols can make the Carrier's Network more transparent with deployment of ISCOM series devices. ITU-T 1731 and Layer-2/3 SLA performance analysis functions help carriers monitor the network traffic statistics; frame delay, jitter and packets loss. ISCOM series switches simplify network management.

Raisecom NView Network management system provides greater functionality and ease of user, especially in comparison with CLI commands. Standard SNMP traps are sent to Raisecom Network management system. The Carrier can easily identify and take corrective action according to the uploaded SNMP traps. Provisional work (upload/download device configuration) is also supported in Raisecom's Network Management System, accelerating deployment and proper configuration of new network devices.

Network Resilience & Redundancy

Raiscom ISCOM series Carrier Ethernet Access/aggregation switches support different network resiliency solutions including G.8031/2 Ethernet linear/Ring switch Protection, LACP, Port backup, STP/ RSTP/MSTP, etc. The link switchover time is typically less than 50ms, enabling Carriers to provide reliable network services.

ISCOM2924GF-4C/4GE

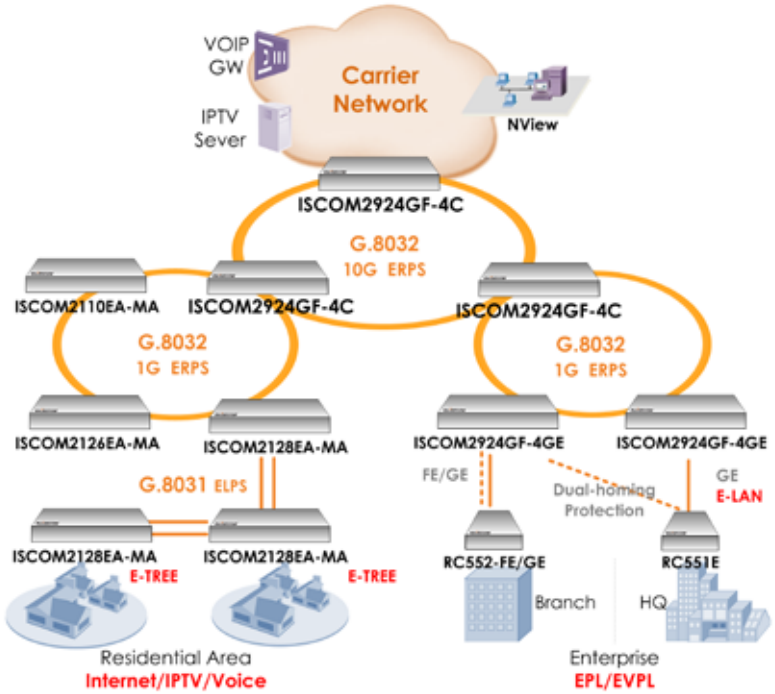
ISCOM2924GF-4C/4GE

Intelligent Aggregation Ethernet Switches

- FE/GE Aggregation Switches with hot swap redundant AC and DC power supply
- Deploy on Metro Ethernet network Edge
- Full redundancy from firmware to hardware to guarantee the maximum uptime
- Complete QoS mechanism is capable to handle multi-streams and flows under congestion
- 4 x 10GE SFP+ uplinks support ring protection and inter-connected ring topo complied with ITU-T G.8032/8031
- Provide access solutions in 24 x 100/1000Base-X+4 x Combo GE uplinks and 24 x 100/1000Base-X + 4 x 10 GE SFP+
- Support hardware based 802.3ah OAM, 802.1ag CFM and Y.1731
- upgrade smoothly from pure Layer 2 to Layer 3 and MPLS functionalitiy via different OS software

ISCOM2924GF Series Ethernet switches provide 24x100/1000Mbps copper/optical SFP ports + 4xGE combo or 4x10GE SFP+ uplinks with redundant AC or DC power supply.

Aggregation switch is deployed on the edge of carrier Ethernet networks. It must handle multiple flows from customer premises where the residential and business connections are both coming into this switch. On the same access point, multiple QoS profiles and queue shaping are enabled based on ports, VLAN or subscribers to guaranteed the service delivered correctly and efficiently. Redundant uplinks make ELPS/ERPS enabled to support G.8031/2 for linear and ring protection. RAISECOM aggregation switch is more advanced to be deployed on the interconnected nodes for interconnected rings. Our strong reliability and robust protocol compliance guarantee the both networks resiliency. Interoperability with other vendors has been tested and performed and approved.



1G/10G aggregation solutions for FTTX and Lease-Line services

RAISECOM aggregation switch easily implements MEF defined E-Line and E-LAN service for carriers and service providers. Not only support all the attributes and performances of MEF-9/14, but also comply with E-LMI, 802.1ag, Y.1731, 802.3ah, LLDP etc. These protocols with respect to ease of management and deployment are all implemented into RAISECOM aggregation switch and approved on interoperability for the protocol compliance.

Current carrier Ethernet service is more and more moving towards pure Layer 2. However, Layer 3 and MPLS functionality are still necessary for some campus and enterprise customers. RAISECOM aggregation switch supports different OS systems to make easy to upgrade from Layer 2 to Layer 3 as well as MPLS smoothly.

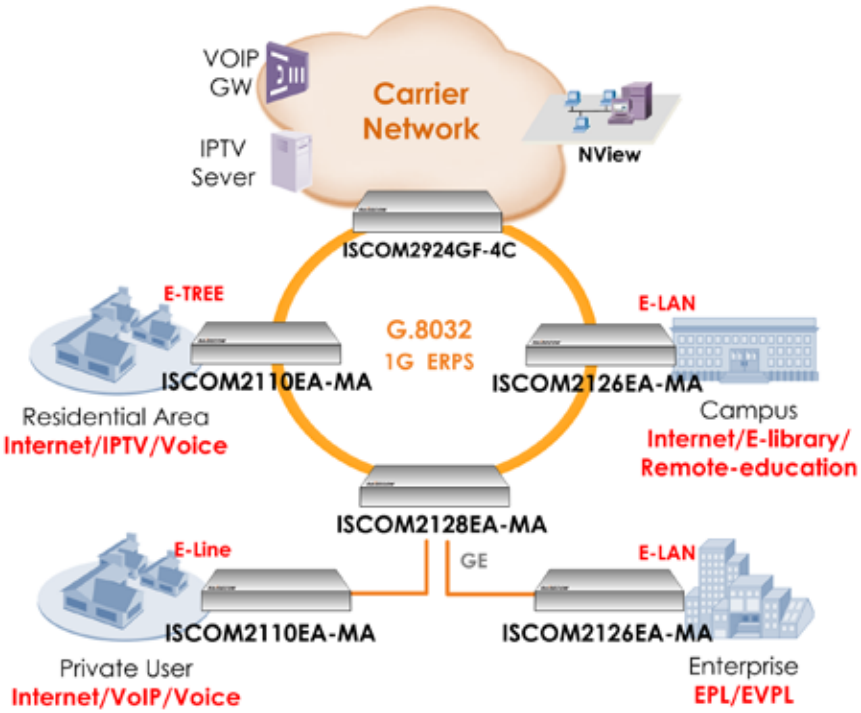
ISCOM21xxEA-MA Series

ISCOM21xxEA-MA Series

Intelligent Layer-2 Managed Ethernet Switches

- FTTB, SME and business connections
- Internet, VoIP, IPTV
- Multiple network resiliency solutions
- Multiple QoS profiles and guaranteed/maximum bandwidth allocation
- SNMP, Web, OAM (802.3ah), CFM (802.1ag, Y.1731)

ISCOM21xxEA-MA series Ethernet switches provide cost effective Carrier network access solution with MEF defined services and attributes. The manageable ISCOM21xxEA-MA series Carrier Ethernet switches can provide 8~24 Fast Ethernet downlinks access solution with 2~4 Gigabit Ethernet SFP uplinks. Both residential and business applications are supported with ISCOM21xxEA-MA series Ethernet switches. Management features, QoS, protection and redundancy. MVR and IGMP snooping enable the switches to meet triple play requirements. E-Line and E-LAN can be deployed cost effectively with these carrier grade switches. Multiple QoS profiles and queue shaping are supported. EAPS makes linear and ring protection easily deployed and supports interoperability with other Ethernet equipment vendors. Comprehensive management supports SLA requirements, fault isolation and OAM functionality.



Intelligent access solutions for FTTX, SME and Business services

ISCOM21xx-PWR series

ISCOM21xx-PWR series

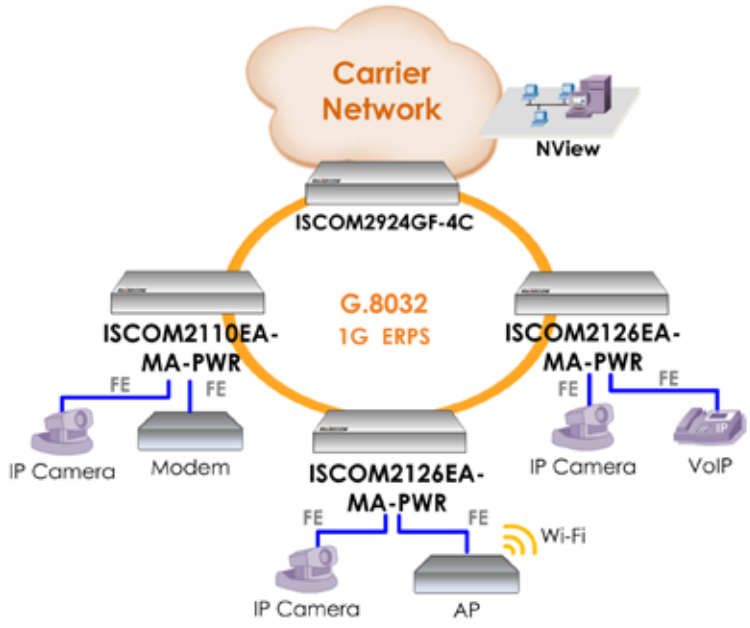
Intelligent Layer-2 Managed PoE Ethernet Switches

- Complied with IEEE802.3af and RFC3621
- Up to 15.4W per PSE port for remote device
- Auto/manual electricity management, overheating protection, priority set up(critical/high/low), port max power set up
- FTTB, SME and business connections
- Internet, VoIP, IPTV
- Multiple network resiliency solutions
- Sophisticated network security assurance in VLANs, QinQs, ACL, etc.
- Multiple QoS profiles and guaranteed/maximum bandwidth allocation
- IEEE803.3ah (OAM), IEEE802.1ag (CFM), ITU-T Y.1731
- SNMP, Telnet, CLI and Web management
- Provide PoE access solutions in 8 x 100Base-T(PSE)+2 x GE combo, 24 x 100Base-T(PSE)+2 x GE combo

ISCOM21xx-PWR series Carrier Ethernet PoE switches provides cost-effective L2 access PoE (Power over Ethernet) solutions complied with IEEE802.3af and RCF3621. As a Power Source Equipment, ISCOM21xx-PWR is deployed at the Ethernet access layer in small/medium enterprise, residential area, campus, etc. The manageable

ISCOM2100xx-PWR series Carrier Ethernet PoE switches can provide 8~24 PSE+ Fast Ethernet downlinks access solutions (up to 15.4 Watts per port) within 2 Giga Ethernet SFP uplinks. ISCOM21xx-PWR PoE switches can offer power supply for PD devices such as wireless Access Point, IP phone and surveillance camera.

ISCOM21xx-PWR PoE switches satisfy for residential or SME (Small, Medium Enterprise) services in terms of management (IEEE802.3ah OAM, IEEE802.1ag CFM, SNMP, Web management, etc.), multiple QoS profiles, bandwidth management, QoS, multiple network resiliency solutions, etc.



Cost-effective access solutions providing IEEE802.3af PoE capabilities

ISCOM21xx-i series

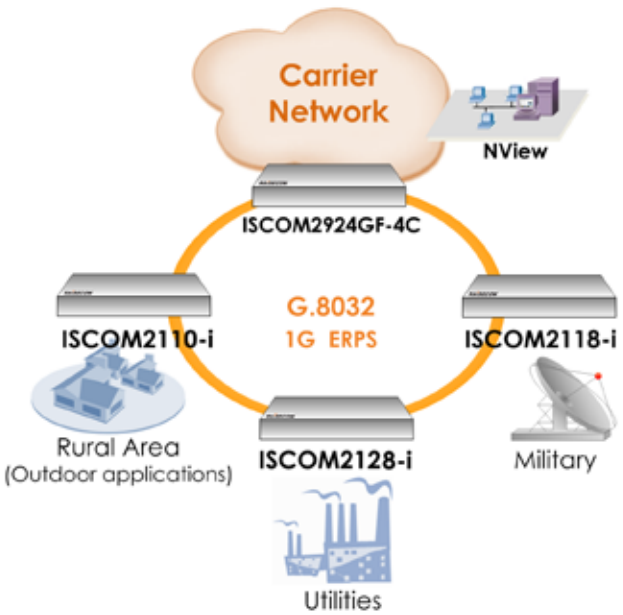
ISCOM21xx-i series

Intelligent Industrial Layer-2 Managable Ethernet Switches

- FE/GE Industrial grade Ethernet Access Switches
- Industrial operating temperature range: -40~85 ˚C
- IP-40 dust protection
- IEC61000-4-5:2005 lightning-proof: up to 6,000V
- Redundancy power supply
- Out-door network deployment in industry, transportation, military, utility, mines and residential areas
- Internet, VoIP, IPTV services
- Multiple network resiliency solutions
- Multiple QoS profiles and guaranteed/maximum bandwidth allocation
- IEEE802.1Q Vlans and QinQ
- SNMPv1/v2c/v3, Web Management, Telnet, OAM (IEEE802.3ah), CFM (IEEE802.1ag, Y.1731)
- Provide Industrial Grade Access solutions in 6 x 10/100Base-T + 2 x 100Base-X + 2 x 100/1000Base-X, 14 x 10/100Base-T + 2 x 100Base-X + 2 x 100/1000Base-X, 16 x 10/100Base-T + 4 x 1000Base-X + 1 extended slot: 8 x 10/100BASE-T/ 8 x 100BASE-X SFP/ 4 x 10/100BASE-T+4 x 100BASE-X SFP

The Raisecom Industrial Ethernet Switches are applied for the industrial environments. ISCOM21xx-i are specifically designed to operate reliably in electrically harsh and climatically demanding environments. ISCOM2110-i is a managed industrial-grade Ethernet switch manufactured by Raisecom, as an ideal solution for out-door networking deployment in industry, transportation, military, utility and residential areas. The intelligent L2 industrial switch incorporates network resiliency with Ethernet Ring technology and redundant power supply system into customers' industrial automation network to enhance system reliability and uptime in the factory harsh environments. It protects customers' industrial network connectivity with switching recovery capability.

ISCOM21xx-i industrial switches can be deployed in the operating temperature range between -40~85 ˚C with IP-40 dust protection and up to 6,000V IEC61000-4-5:2005 lightning-proof. ISCOM2110-i is also an intelligent L2 industrial switch that delivers advanced QoS, standard IEEE802.3ah OAM & IEEE802.1ag CFM tools, enhanced network security and reliable Fast and Gigabit Ethernet connectivity under harsh operating conditions with supporting all the attributes and performances of MEF-9/14. Raisecom industrial switch easily implements E-Line and E-LAN service for carriers and service providers. Those protocols with respect to ease of management and deployment are all implemented into Raisecom industrial switch and approved on interoperability for the protocol compliance.



Ethernet access solutions for out-door or industrial-grade harsh environment and high reliable applications

Chapter 4 - Ethernet Passive Optical Network

Optical fiber will continue to replace copper network infrastructure. Initially targeting long haul and enterprise applications fiber is now being commonly deployed for the residential market. Passive Optical Network has become arguably the most popular outside plant architecture for delivering Triple Play services of high-speed data, video, and voice.

Ethernet Passive Optical Network technology is PON technology over Ethernet. It is the System Architecture commonly used for FTTB/FTTC/FTTO/FTTP/FTTN and FTTH. Due to it is economical and efficient network structure, EPON is an effective and popular communication approach for the access network.

Compliant with all IEEE standards, Raisecom's EPON product family includes ISCOM5800E and ISCOM5504 Optical Line Termination system deployed at the Central Office as well several models of Optical Network Units deployed at the customer's premises. The OLT provides direct optical connection with the core/aggregation network, while the ONU terminates the PON at the customer site. The EPON system provides the uniform transmission of native Ethernet service for the last mile, enabling up to 10Gbps bandwidth to multiple residential and business customers, delivering high-speed voice, data, video services, extensible TDM and xDSL service provisioning to residential and business subscribers.

ISCOM5800E

ISCOM5800E

EPON Chassis OLT

- Backplane can support 256Gbps
- Up to 1:64 split ratio and up to 20km transmission distance
- Each OLT supports up to 2560 remote ONUs
- 11 slots of service units can be mixed plugged with 2PON/4PON/2GE/4GE/10GE line modules; 2 slots SMC control modules, support hot redundancy without affecting the business
- Redundant Power Supply
- 1+1 automatic protection, support different PON interfaces protecting, link diagnostic on PON network.
- IEEE 802.3ad Link aggregation, up to 14 trunk groups, 8 ports in each trunk
- Bi-directional AES-128 encryption, triple churning
- Static routing, RIPV2 and OSPF
- DHCP Snooping, DHCP option82, DHCP server/client, DHCP relay
- Upgradeable dynamic DBA algorithm for end user bandwidth allocation, Customized Quality of Service for assured SLA
- Enhance ACL function for security classification of incoming L2 to L4
- IEEE802.1P QoS, support CAR function, up to 8 output queues for each port, SP, WRR and SP+WRR queue scheduling policy, 2K data flow queues
- Storm control of broadcast, multicast, DLF
- IEEE802.3x Flow control in full duplex, back pressure in half duplex
- IEEE802.1d/w STP, RSTP and MSTP for improving network resiliency and reliability
- IEEE802.1Q 4K VLAN, VLAN stacking, swapping, rewriting and IEEE802.1ad flexible QinQ
- IEEE802.3ah standard OAM and extended 802.3ah OAM
- 32K MAC address table, 100 static MAC address
- Up to 8 Ethernet rings, 124 devices in each ring
- IGMP Snooping V1/V2/V3, IGMP Proxy, Multicast VLAN Registration for video services
- Console/Telnet/SNMP management/GUI NMS user-friendly interface

The ISCOM5800E is the enhanced Optical Line Terminal of Raisecom's EPON system with various line modules, including 2/4/10 GE line module for uplink, 2/4 PON line module for downlink, 1 fan, 2 power supply slots and 2 SMC module slots for hot redundancy. The 19 inch 6U high ISCOM5800E is located in the operator's central office and designed to provide powerful routing ability, access capacity and utilizes 15 slot chassis, redundant SMC control module. It provides 11 service slots which can be used for different service modules. ISCOM5800E also supports flexible uplink interface allocation, and together with Raisecom's ONU, it can be extended to support voice gateway interface, video interface (IPTV, CATV, HDTV etc.), xDSL interface, automatic meter reading and TDM interface.

ISCOM5800E deployed in a central office and can be managed through Console, Telnet, and can be also locally and remotely monitored and controllable by SNMP through Raisecom GUI-basic NView NNM network management platform. With redundant power supply and SMC, 1+1 automatic protection based on PON port, the ISCOM5800E provides maximum uptime while reducing both Capital Expenditure and maintenance costs.

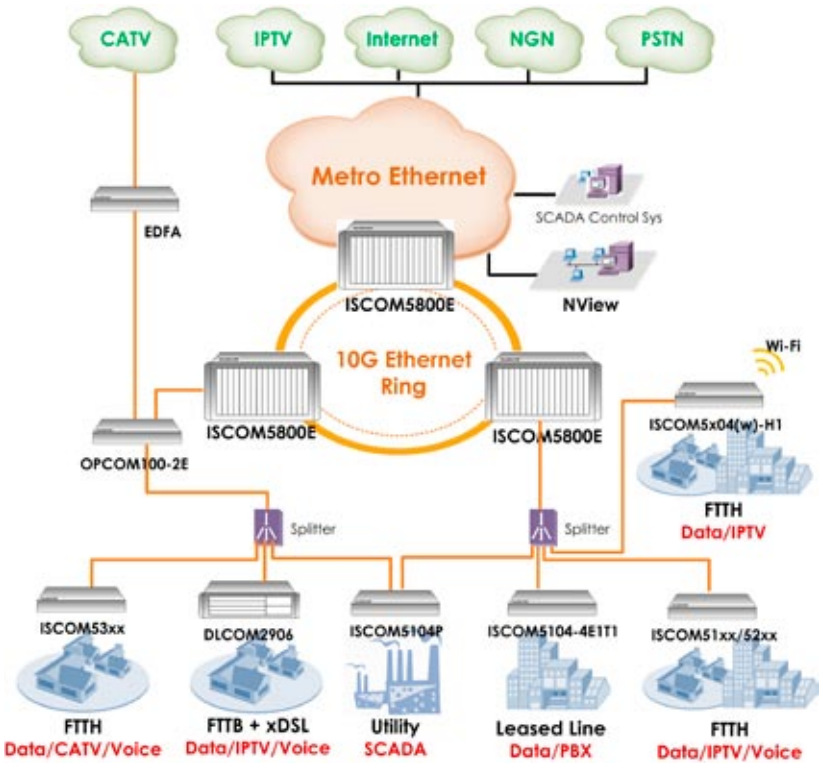
ISCOM5800-2GE/4GE

ISCOM5800-2GE/4GE
ISCOM5800E-10GEX2-2GE
Aggregation Module

ISCOM5800E-10GEX2-2GE

- ISCOM5800-2GE/4GE support 2/4 gigabit combo interfaces for connecting with uplink switches
- ISCOM5800E-10GEX2-2GE supports 2 x 10 GE interface and 2 x 100/1000M interfaces for connecting with uplink switches
- Full/half duplex mode, auto-negotiation
- Ethernet port isolation configuration for customer separation, VLAN tag transmission transparently
- Based on ingress and egress of each port, 64k increment
- Rate limiting is based on ingress and egress traffic of each port
- Support link aggregation
- Support IEEE 802.3x flow control in full duplex, support back pressure flow control in half duplex
- ISCOM5800-2G/4G max frame size: 8000bytes
- ISCOM5800E-10GEX2-2GE max frame size: 12000bytes
- Support multi-to-one port mirror and separately mirroring of ingress and egress

ISCOM5800-2GE/4GE is the gigabit combo interface line module, it provides 2/4 gigabit combo interfaces for connecting with uplink switches. ISCOM5800E-10GEX2-2GE line module provides 2 x 10GE interfaces for connecting with uplink switches and also supports 2 x 100/1000M interfaces for service aggregation. Link aggregation supported for line site. If failure is detected in one port of the group, the GE module will immediately switch to another port of the group.



Aggregate multi-services for FTTX, Utility and Leased Line applications

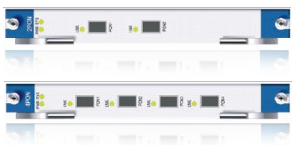
ISCOM5800E-SMC

ISCOM5800E-SMC

Management Module

- Console interface: connector type RJ45, complies with RS232 standard
- SNMP and NM-EXT interface: Connector type RJ45, 10/100 Base-T Auto-negotiation

ISCOM5800E-SMC is the management interface line module, which can be inserted into slot 7 and 8, 3 x RJ-45 ports: common SNMP port, extended SNMP port and console port. It is integrated with management subsystem, store and forward subsystem and 1+1 hot redundancy subsystem. It communicates with NMS by reporting alarm traps and answering polls and also executing configuration commands on local EPON OLTs and remote ONUs, SMC module is a necessary component of the ISCOM5800E.



ISCOM5800-2PON/4PON

ISCOM5800-2PON
ISCOM5800-4PON

Tributary Module

- Support different PON interfaces protecting in the same PON line module line
- Support protection between different PON line modules
- SFP optical module, SC/PC connector, single mode, single-strand 1310 nm burst receive, 1490 nm continuous transmit
- Symmetric 1.25Gbps, 20km distance, split ratio: 1:64, Indicators: LNK, ACT

ISCOM5800-2PON/4PON is the PON interface line module. It provides 2/4 single-strand fiber PON interfaces for communicating with downlink ONU and 1+1 protection for line site. In this case, if failure is detected in primary line, ISCOM5800-2PON/4PON will immediately switch to secondary line and the switchover time is much lower than 1 um.

ISCOM5504

ISCOM5504

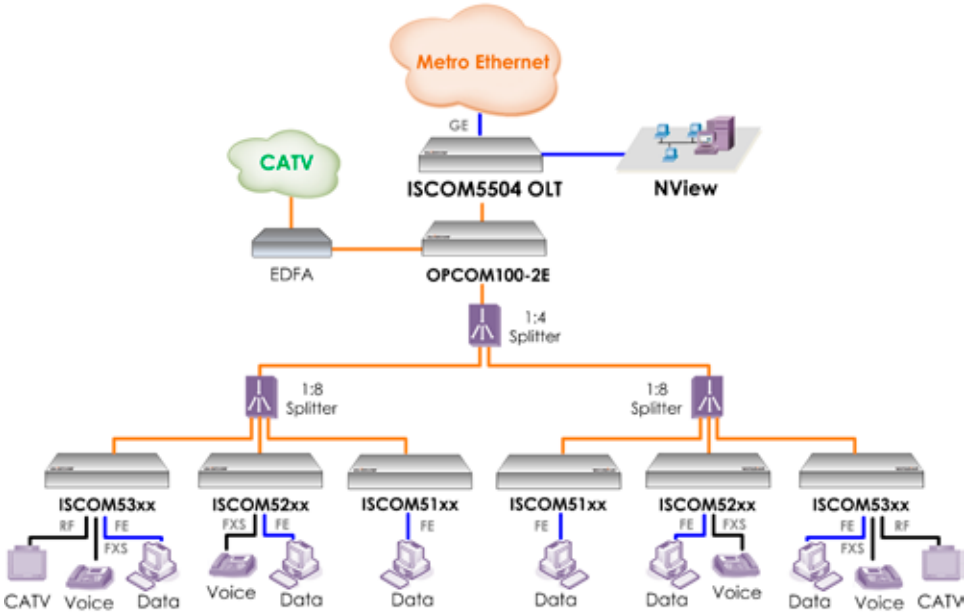
EPON Standalone OLT

- 1.25Gbps symmetric rate for both upstream and downstream traffic
- Up to 1:64 split ratio, up to 20km transmission distance, supports 256 remote ONUs
- IEEE 802.3ad Link aggregation, PON interfaces protected, redundant Power Supply
- Upgradeable dynamic DBA algorithm, Customized Quality of Service for assured SLA
- Enhance ACL function for security classification of incoming L2 to L4
- IEEE802.1P QoS supports based on SP, WRR and SP+WRR, 8 priority queues per port
- IEEE802.3x Flow control in full duplex, back pressure in half duplex
- IEEE802.1d/w STP, RSTP and MSTP
- IEEE802.1Q 4K VLAN, IEEE802.1ad QinQ
- DHCP Snooping, DHCP option82, DHCP server/client, DHCP relay
- 16K MAC address table, 100 static MAC address, MAC address binding,
- Up to 8 Ethernet rings, 124 devices in each ring
- Bi-directional AES-128 encryption, triple churning
- Storm control of broadcast, multicast and DLF, port isolation, port mirror
- IGMP Snooping V1/V2/V3, IGMP Proxy, MVR
- IEEE802.3ah standard OAM, extended 802.3ah OAM
- Console/Telnet/SNMP management/GUI NMS user-friendly interface

ISCOM5504 is standalone Optical Line Terminal of EPON system that aggregates Ethernet traffic from remote ONU devices through passive optical splitters. It provides 4 single-strand PON interfaces for communicating with downlink ONU devices, 4 gigabit combo interfaces for connecting with uplink switches, one console port, one MNGT port for out-of band management, two power supplies for redundancy,

enabling a high-speed and cost-efficient FTTX solution in last mile. Together with ONU, it can be extended to support voice gateway interface, video interface (IPTV, CATV, HDTV etc.), xDSL interface, automatic meter reading and TDM interface.

ISCOM5504 is deployed in the central office and can be managed through Console, Telnet, and can be locally or remotely monitored and controllable by SNMP through Raisecom GUI-basic NView NNMS.



Triple-play services over optical access networks

ISCOM5104Q

ISCOM5108-PSE/5108/5104P/
5104/5101/5116/5124

ISCOM5104-H1

ISCOM51xx Series

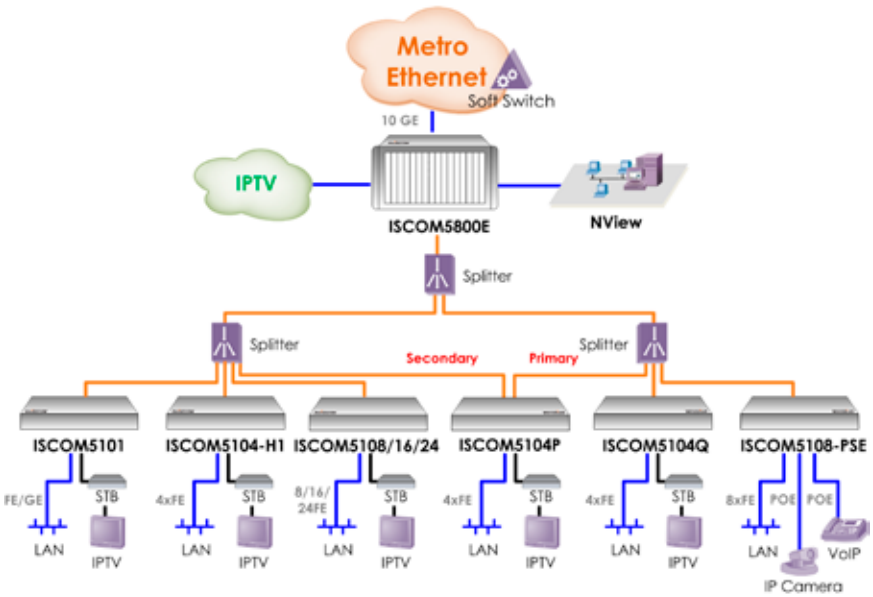
EPON ONU for Data

- IEEE802.3ah compliant EPON ONU device
- Symmetric speed for 1.25Gbit/s, 10/100M or 10/100/1000M auto negotiation
- Up to 1:64 split ratio and 20km transmission distance
- Bi-directional AES-128 encryption, triple churning
- Based on automatic discovery and configuration of the ONU "Plug and Play"
- Link measurement and diagnostics for PON networks
- MAC address binding, port isolation, 802.1x based on port/MAC
- Port mirroring based on ingress and egress
- Loopback detection for avoiding storms caused by end user loop
- Upgradeable dynamic DBA algorithm, Customized QoS for assured SLA, Rate-limiting on Ethernet and PON interface
- Enhanced ACL function for security classification of incoming L2 to L4 packets.
- IEEE802.1P QoS, IPV4, up to 4 output queues, SP, WRR and SP+WRR
- Storm control of broadcast, multicast and DLF, IEEE802.3X flow control
- STP and RSTP for improved network resiliency and reliability
- IEEE802.1Q 4K VLAN, VLAN stacking, swapping, rewriting, IEEE802.1ad flexible QinQ
- IGMP v1/v2/v3 for video services
- IEEE802.3 standard OAM, extended 802.3ah OAM
- Console/Telnet/SNMP/GUI NMS user-friendly interface

ISCOM5101, ISCOM5104/-H1/Q/P, ISCOM5108/-PSE, ISCOM5116, ISCOM5124 introduced by Raisecom are client-side Optical Network Unit devices. They provide 1/4/8/16/24 x 10/100 Base-T or 1 10/100/1000 Base-T Ethernet interface respectively and one or two single strand PON interface.

ISCOM5104Q is designed with an enclosed metal shell that is waterproof and dustproof for harsh out-door environment; The ISCOM5104-H1 is designed with attractive plastic shell, can be directly placed in terminal user's home for FTTH solution at a low cost, ISCOM5104P provides two single strand PON ports for PON line protection switching, one is primary, the other is secondary. ISCOM5108-PSE is a "Power over Ethernet" product following IEEE802.3af standard, which can supply remote PD device (VOIP phone, wireless Access Point, IP Camera etc.) with power through an Ethernet port.

Together with Raisecom OLT devices, the ISCOM51xx family ONU provides full L2 switching functionality for high speed data and IPTV services. ISCOM51xx series ONU devices can be remotely monitored and managed through OLT devices and GUI NMS interface.



FTTH and FTTB solutions delivering assured data services primarily

ISCOM5204/5208/5216/5224

ISCOM5204-H1

ISCOM5204W-H1

ISCOM52xx series

EPON ONU for Data + Voice

ISCOM5204-H1/5204W-H1

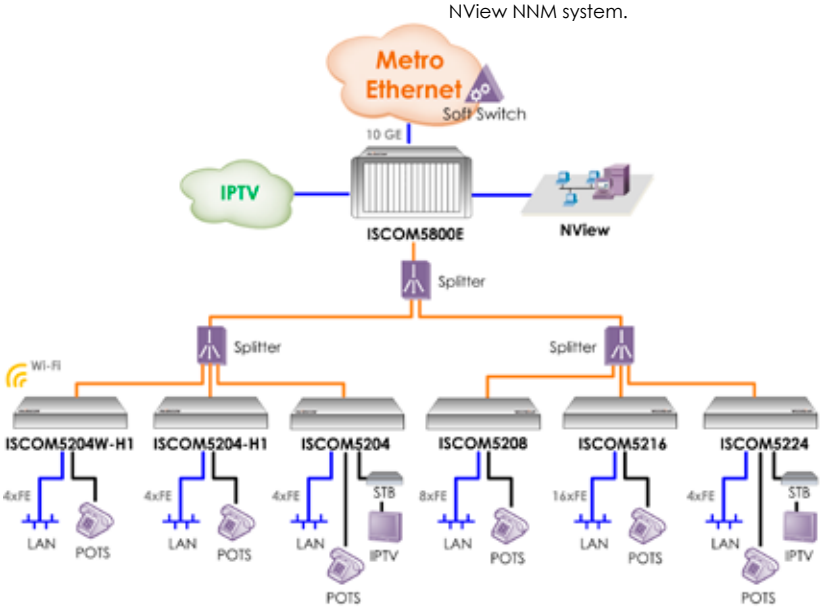
EPON Home Gateway for Data + Voice + Wi-Fi

- IEEE802.3ah compliant EPON ONU device
- Up to 1:64 split ratio and 20km transmission distance
- SIP, H.248, SDP, RTP/RTCP, TCP, UDP, MGCP protocols
- Codec: G.711 a/μ law, G.729,G.726.G.723 etc
- Peer-to-peer direct calls, mixed SIP,P2MP calls by SIP proxy server
- ISCOM5204W-H1 supports home gateway, IEEE 802.11a/b/g/n, WPS compliant for wireless, data transfer rate support 270Mbps, frequency range support 2.4 GHz
- Symmetric speed for 1.25Gbit/s, 10/100M auto negotiation
- Bi-directional AES-128 encryption, triple churning
- Based on automatic discovery and configuration of the ONU "Plug and Play"
- Link measurement and diagnostics for PON networks
- MAC address binding, Port isolation, 802.1x based on port/MAC
- Loopback detection for avoiding storms caused, port mirror
- Upgradeable dynamic DBA algorithm, rate-limiting on Ethernet and PON interface, customized QoS for assured SLA
- Enhanced ACL function for security classification of incoming L2 to L4 packets
- IEEE802.1P QoS, IPV4, up to 4 output queues, SP, WRR and SP+WRR
- Storm control of broadcast, multicast and DLF, IEEE802.3X flow control
- STP and RSTP for improved network resiliency and reliability
- IEEE802.1Q 4K VLAN, VLAN stacking, swapping, rewriting, IEEE802.1ad flexible QinQ
- IGMP v1/v2/v3, for video services
- IEEE802.3 standard OAM, extended 802.3ah OAM
- Console/Telnet/SNMP/GUI NMS user-friendly interface/Web-based GUI

ISCOM5204/-H1/W-H1, ISCOM5208, ISCOM5216, ISCOM5224 are ONU devices of Raisecom EPON family, which are designed for PON access to residential and business subscribers. The complete product line provides both data and voice services, designed for FTTX. Together with Raisecom OLT, they can provide for data, VOIP call via analog phone, fax and IPTV services, respectively, 4/8/16/24 x 10/100 Base-T Ethernet interface, 2/8/16/24 FXS port for analog phone and one single strand PON interface.

For flexibility, Raisecom provides multi-function ONU supporting various applications. ISCOM5204-H1 and ISCOM5204W-H1 are designed in attractive plastic shell, and can be directly placed in terminal or user's home for FTTH solution; The ISCOM5204W-H1 can support home gateways and Wi-Fi function, IEEE 802.11n compliant for wireless access.

Together with the Raisecom ISCOM5504 and ISCOM5800E OLT devices, the ISCOM52xx family ONU provides full L2 switching functionality for high speed data, voice and IPTV services, can be remotely monitored and managed through OLT device and GUI NView NNM system.



FTTH and FTTB solutions delivering assured data and voice services primarily

ISCOM5304/5304D

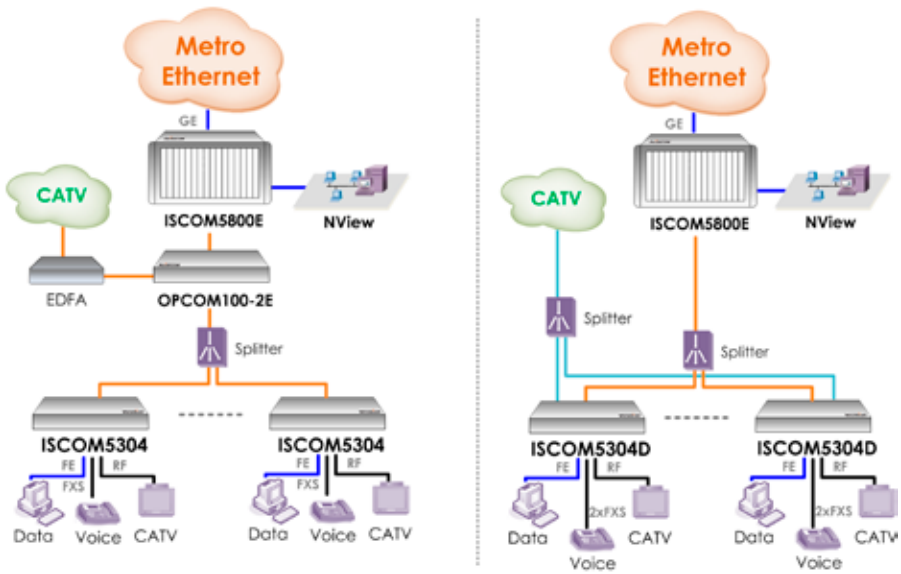
ISCOM53xx series

EPON ONU for Data + Voice + CATV

- IEEE802.3ah compliant EPON ONU device
- ISCOM53xx series supports CATV function, cable television
- SIP, H.248, SDP, RTP/RTCP, TCP, UDP, MGCP protocol
  Codec: G.711 a/μ law, G.729, G.726. G.723 etc.
- Symmetric speed for 1.25Gbit/s, 10/100M auto negotiation
- Bi-directional AES-128 encryption, triple churning
- Based on automatic discovery and configuration of the ONU "Plug and Play"
- Link measurement and diagnostics for PON network
- Loopback detection, storm control of broadcast, multicast and DLF, IEEE802.3X flow control
- MAC address binding, port isolation, port mirror based on Ingress and egress per port
- Upgradeable dynamic DBA algorithm, Customized QoS for assured SLA
- Enhanced ACL function for security classification of incoming L2 to L4 packets.
- IEEE802.1P QoS, IPV4, up to 4 output queues, SP, WRR and SP+WRR
- STP and RSTP for improved network resiliency and reliability
- IEEE802.1Q 4K VLAN, IEEE802.1ad flexible QinQ
- IGMP v1/v2/v3 for video services
- IEEE802.3 standard OAM, extended 802.3ah OAM
- Console/Telnet/SNMP/GUI NMS user-friendly interface

ISCOM5304, ISCOM5304D introduced by Raisecom are client-side Optical Network Unit devices, which fully integrate EPON and switch technology, designed for FTTH solution, with Raisecom OLT devices, they can provide residential users with high-speed broadband data, VOIP call via analog phone, fax, IPTV and CATV services.

ISCOM5304 provides one single strand PON interface, 4 x 10/100M Ethernet interface, 2 x Pots interfaces and 1 x RF for receiving TV program. ISCOM5304D provides one single strand PON interface, 4 x 10/100M Ethernet interface, 2 x Pots interfaces, 1 x RF for receiving TV program and 1 x CATV optical port for connecting with CATV network. ISCOM53xx family ONU can be remotely monitored and managed through OLT devices and GUI NMS interface.



Single-fiber or dual-fiber delivering for triple-play services

ISCOM5104P-2R/5104P-4R3/
5104P-4R8/5104-4E1T1

ISCOM5104P-X series

EPON Optical Network Unit with Data + Automatic Meter Reading + PON link protection

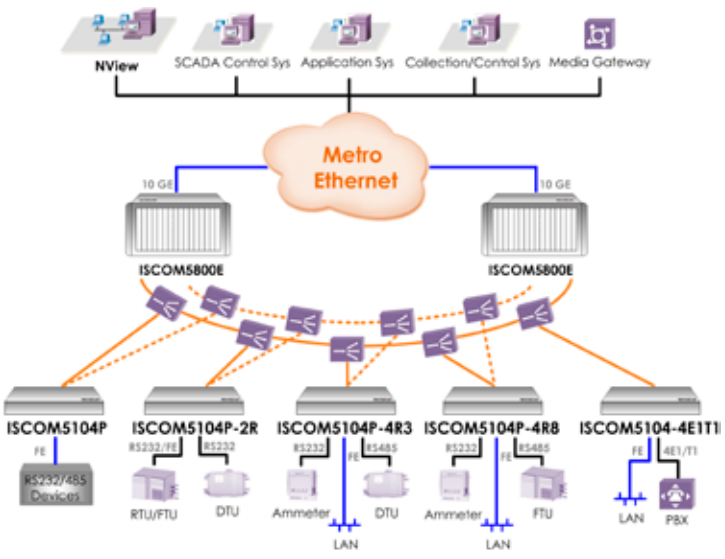
ISCOM5104-4E1T1

EPON Optical Network Unit with Data + TDM

- IEEE802.3ah compliant EPON ONU device
- ISCOM5104P-X series supports redundant PON link protection, RS232/RS485 ports for Automatic Meter Reading, the serial port rate 300/1200/2400/4800/9600/19200bps
- ISCOM5104-4E1T1 supports TDM over IP access, complies with G.703, G.704, G.823 and G.8261 standards
- Symmetric speed for 1.25Gbit/s, 10/100M auto negotiation,
- Bi-directional AES-128 encryption, triple churning
- Based on automatic discovery and configuration of the ONU "Plug and Play"
- Link measurement and diagnostics for PON networks
- Loopback detection for avoiding storms caused by end user loop
- MAC address binding, port isolation
- Port mirroring based on Ingress and egress per port
- Upgradeable dynamic DBA algorithm for end user bandwidth allocation
- Customized QoS for assured SLA
- Enhanced ACL function for security classification of incoming L2 to L4 packets.
- IEEE802.1P QoS, IPV4, up to 4 output queues, SP, WRR and SP+WRR
- Storm control of broadcast, multicast and DLF, IEEE802.3X flow control
- STP and RSTP for improved network resiliency and reliability
- IEEE802.1Q 4K VLAN, IEEE802.1ad flexible QinQ
- IGMP v1/v2/v3 for video services
- IEEE802.3 standard OAM, extended 802.3ah OAM
- Console/Telnet/SNMP/GUI NMS user-friendly interface

ISCOM5104P-2R, ISCOM5104P-4R3, ISCOM5104P-4R8, ISCOM5104-4E1T1 are ONU devices of Raisecom's EPON product line, with the Raisecom OLT, which provides full L2 switching functionality for data and IPTV services. The EPON architecture is ideal solution for carriers deploying packet switching networks with limited fiber resource.

ISCOM5104P-2R, ISCOM5104P-4R3, ISCOM5104P-4R8 can provide 1:1 link protection from splitter to ONU and can support automatic meter reading function by connecting with a 2/4 x RS232 or RS485 port. The ISCOM5104-4E1T1 device can support TDM over IP gateway bridging the gap between traditional TDM networks and Packet-switched networks via downlink with 4 x E1/T1 port and uplink will connect IP and MPLS network through PON port. These ONUs are designed for FTTX, and can be remotely configured and managed via ISCOM OLT series and GUI NView NNM system.



High-reliable solutions for SCADA and leased line

Optical Passive Splitter

Indoor optical splitter

Indoor/outdoor optical splitter

Outdoor optical splitter

Plug and play, the optical Splitter is a passive optical device that connects the OLT and ONU with many fiber ends, combining one or two fiber inputs into two or more fibers outputs, it is generally deployed in an optical distribution network giving carriers the ability to split optical signals to multiple customer premises, thus enabling the connection of multiple branch optical fibers through trunk.

Raisecom provides various optical splitters with split ratios from 1:2, 1:4, 1:8, 1:16, 1:32 and 1:64 with different encapsulation and optical connectors for a wide range of applications, including indoor, indoor/outdoor, outdoor units. The Indoor/outdoor optical splitter has 1.5m fiber; The outdoor optical splitter can be installed in wall-mount cabinets, pole mounted, and in underground environments providing water-proof and dust-proof capabilities with protection grade reaching IP65, also, have optional accessories for cable entry, fix fiber splices, splitter installation.

Optical property of Products						
Parameter	Specifications					
Split Ratio	1×2	1×4	1×8	1×16	1×32	1×64
Typical Insertion Loss (dB)	4.2	7.4	10.7	14.0	17.3	21.3
Max Insertion Loss (dB)	4.3	7.6	10.9	14.2	17.5	21.9
Max Uniformity (dB)	0.8	0.8	0.8	1.0	1.5	2.0
Max Polarization Dependent Loss (dB)	0.3	0.3	0.3	0.3	0.3	0.5
Min Directivity (dB)	55	55	55	55	55	55
Min Echo Loss (dB)	55	55	55	55	55	55

Optical property of Products						
Parameter	Specifications					
Split Ratio	2×4	2×8	2×16	2×32	2×64	2x4
Typical Insertion Loss (dB)	7.8	11.2	15.0	18.2	21.7	7.8
Max Insertion Loss (dB)	8.0	11.4	15.2	18.4	21.9	8.0
Max Uniformity (dB)	0.8	0.8	1.0	1.5	2.0	0.8
Max Polarization dependent Loss (dB)	0.3	0.3	0.3	0.3	0.5	0.3
Min Directivity (dB)	55	55	55	55	55	55
Min Echo Loss (dB)	55	55	55	55	55	55

Chapter 5 - Mini IP DSLAM DLCOM 2096

DLCOM2096

DLCOM2096-24ADSL / 48POTS

DLCOM2096-16VDSL/16FE

DLCOM2096-SMCVPA-2GE

DLCOM2096-SMCVPA-EPON

DLCOM2096

The DLCOM2096 mini chassis IPDSLAM offers various access services, including ADSL, ADSL2, ADSL2+, VDSL, VDSL2, FE and POTS. Utilizing an existing copper network, it can be regarded as a traditional IP DSLAM without any network upgrade. For new fiber networks, it can be deployed as an ONU with an IP DSLAM interface to aggregate various services such as xDSL, VoIP. Together with the copper and fiber network, it can present carriers an ideal solution for deploying both xDSL + FTTx topologies. The mixed solution combines the advantage of PON and DSL technology, namely, low cost with high bandwidth, and long transmission with good interoperability.

DLCOM2096-24ADSL supports 24 channels of ADSL/ADSL2/ADSL2+ for remote users, Maximum 96 channels, it transforms ATM cells to IP packets, the max transmission distance is 6.5km, complies with ADSL/ADSL2/ADSL2+ annex A, annex M and annex L.

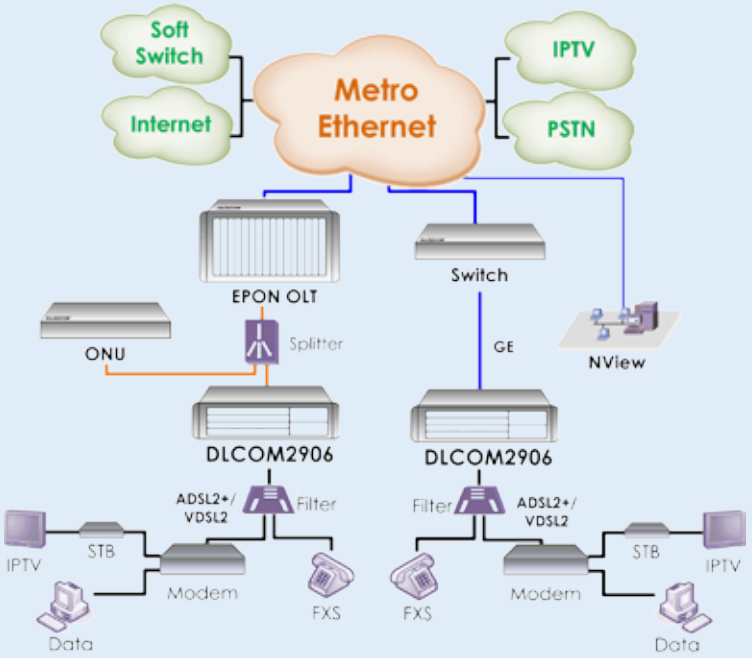
DLCOM2096-24/48POTS provides 24/48 channels narrow bandwidth voice POTS for remote users. Maximum 96/192 channels, supports SIP/H.248 protocol, interconnecting with SS and providing voice services meanwhile, satisfies client line test capacity.

DLCOM2096-16VDSL provides 16 channels VDSL2/ VDSL for remote users, compatible with ADSL/ADSL2/ADSL2+, Maximum 64 channels, supports ITU-T G.993.2 VDSL2 all 8 profiles including 30a, interoperable with major VDSL2 CPE and ADSL2/ADSL2+ CPE devices.

DLCOM2096-16FE provides 16 x 10/100 Base-T auto-negotiation Ethernet interfaces for remote users, Maximum 4 x 16 ports, 100m maximum transmission distance. Mainly supports IEEE802.3/ IEEE802.3X/ IEEE802.3u standards.

DLCOM2096-SMCVPA-EPON/2GE are configurable, manageable, control line modules, that provide selected uplink ports including an EPON port or 2GE electrical/ optical ports, supports narrow bandwidth VOIP service with additional VOIP sub-module, and aggregates, protocol process and forward ATM cell from ADSL/VDSL line module to IP uplink.

DLCOM2096 can be managed through the Console port, Telnet, and can also be monitored and controlled by SNMP through the Raisecom GUI-basic NView NNM network management platform.



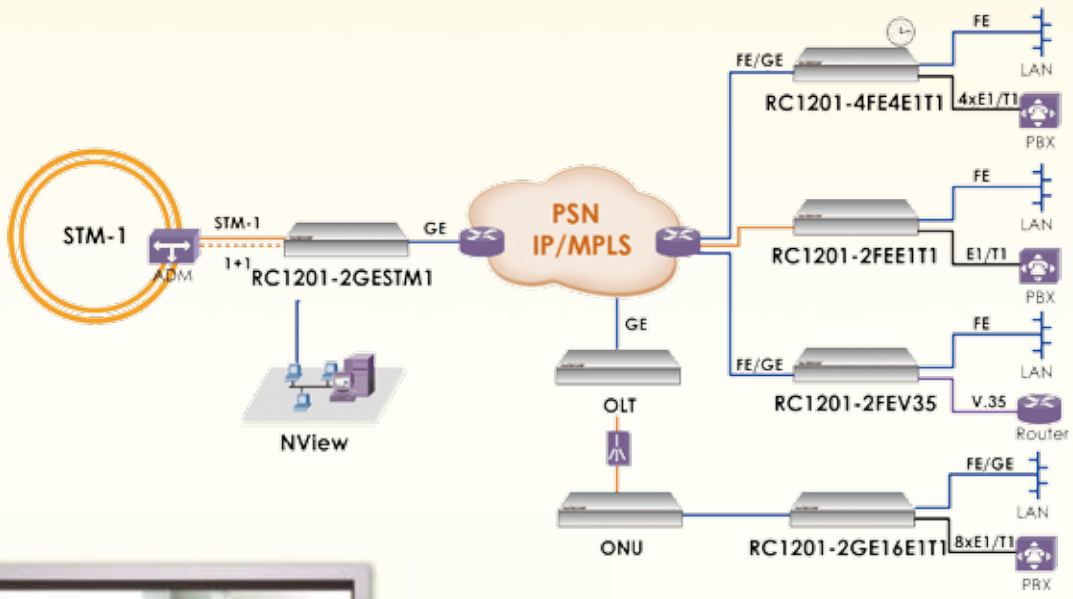
Cost-effective xDSL + FTTx solutions

Chapter 6 - TDM over IP

Recognizing the tremendous growth of data traffic, carriers and service providers have started to build out IP networks on top of their circuit infrastructure. But with the boom of IP networking and OPEX concerns, it is not possible for carriers and service providers to maintain two networks for voice and data traffic separately. Instead, carriers are combining both data and voice traffic on a single packet-switched network.

TDM over IP has emerged as an efficient and cost-effective solution for transporting revenue-generating legacy services over the PSN. TDM over IP technology takes advantage of PSN networks to help carriers and service providers reduce CAPEX without compromising functionality or services, thus maximizing and protecting their investment by transparently transporting TDM services over Ethernet/IP/MPLS networks.

As the world leading last mile access solution provider, Raisecom's TDM over IP product line gives carriers and service provider a flexible and cost-effective solution to convert the data stream coming from its two TDM ports or a high speed serial port into configurable-sized packets that are extended over the Fast Ethernet network port. By deploying the Raisecom RC1201 series TDM over IP gateway, carriers can extend the PSN for any users with standard T1/E1 or serial data interface, enabling a smooth convergence of legacy TDM service and fast-growing IP services on a single network.



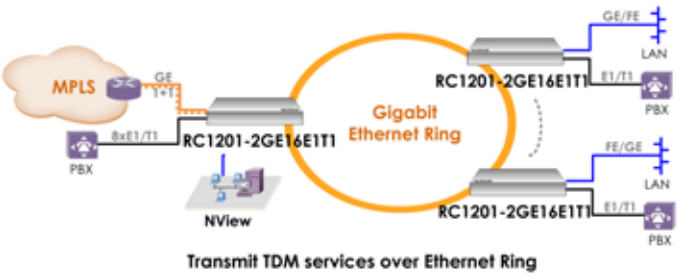
RC1201-2GE16E1T1

RC1201-2GE16E1T1
RC1201-2GESTM1

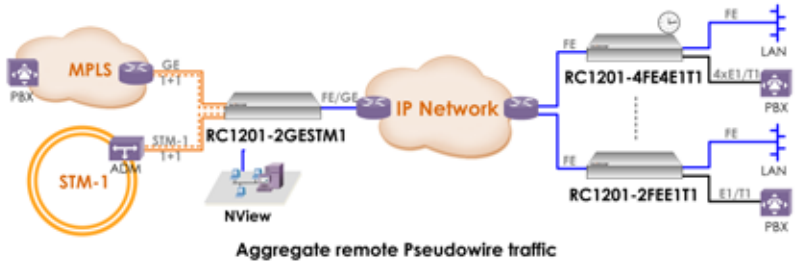
Aggregation TDM over IP Gateway

- Transmits TDM services over Ethernet, IP or MPLS packet-switched
- 1 or 4 E1/T1 ports, 2 or 4 Fast Ethernet ports for downlink,1 Gigabit Ethernet (SFP-based) for uplink
- Transparent to all signaling protocols
- IEEE802.1p&Q, ToS/Diff Serv and EXP bits for QoS marking of the TDM over IP traffic in Ethernet, IP and MPLS network
- TDMoIP, CESoPSN, SAToP and HDLCoPSN TDM pseudowire standards are supported
- Selectable clock source: internal clock, recovered clock from E1/T1 site, recovered clock from PSN and external clock
- Configurable jitter buffer compensates the delay variation introduced by PSN
- Both balanced 75ohm and unbalanced 120ohm E1 connector are supported
- Local terminal, remote Telnet and GUI management

The RC1201 series is aggregation TDM over IP gateway, which carries TDM traffic transparently over PSN. By deploying in pairs or aggregate with remote RC1201 devices, RC1201-2GESTM1 provide PSN extension for any user with STM-1 interface. It deploys various encapsulation modes over Ethernet payload mechanisms. In addition, the device supports UDP/IP, MPLS and Ethernet. It is equipped with large and configurable jitter buffers to compensate for delay variation introduced by the PSN. The device provides four selectable clock modes and four Ethernet payload encapsulation modes, and a selectable clock sub-card to recover the external clock.



Transmit TDM services over Ethernet Ring



Aggregate remote Pseudowire traffic

RC1201 series aggregation gateway is compact design and aggregates TDMoIP traffic from multiple sources. STM1 device support separate configuration for up to 63 E1 mapping. In addition, it supports Resilient Ethernet Ring to protect pseudowire traffic switched-over when link failure occurring. Users' LAN traffic can be rate-limited, tagged, stacked and filtered for better engineering the network and allowing a granular bandwidth capacity offering. It also supports QoS mechanism, which enables IEEE802.1p&Q, ToS/Diff Serv and EXP bits for priority marking of the TDM over IP traffic in PSN. The device incorporates various OAM mechanisms to monitor LAN and IP layer performance statistics and pseudowire link state. Flow control and Fault propagation are available for easy operation. The device can be configured locally via CLI, telnet, SNMP or Raisecom network management system RC NView NNM. The TDM over IP gateway supports both out-of-band and in-band management.

RC1201-2FEE1T1(2FEV35)
RC1201-4FE4E1T1

RC1201-2FEE1T1
RC1201-2FEV35
RC1201-4FE4E1T1

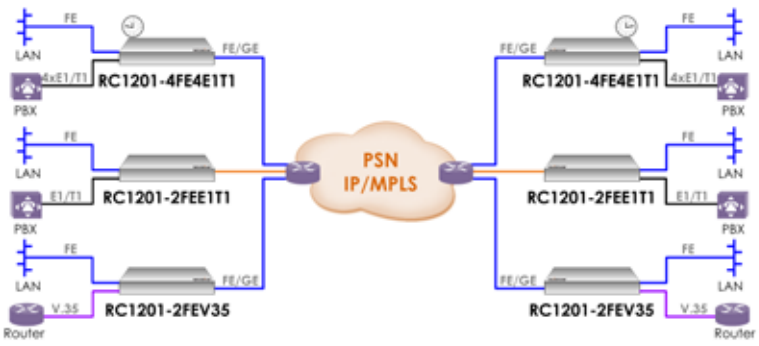
E1/T1 to Fast Ethernet TDM over IP Gateway

- Transmits TDM services over Ethernet, IP or MPLS packet-switched
- 1 or 4 E1/T1 ports, 2 or 4 Fast Ethernet ports for downlink,1 Gigabit Ethernet (SFP-based) for uplink
- Transparent to all signaling protocols
- IEEE802.1p&Q, ToS/Diff Serv and EXP bits for QoS marking of the TDM over IP traffic in Ethernet, IP and MPLS network
- TDMoIP, CESoPSN, SAToP and HDLCoPSN TDM pseudpwire standards are supported
- Selectable clock source: internal clock, recovered clock from E1/T1 site, recovered clock from PSN and external clock
- Configurable jitter buffer compensates the delay variation introduced by PSN
- Both balanced 75ohm and unbalanced 120ohm E1 connector are supported
- Local terminal, remote Telnet and GUI management

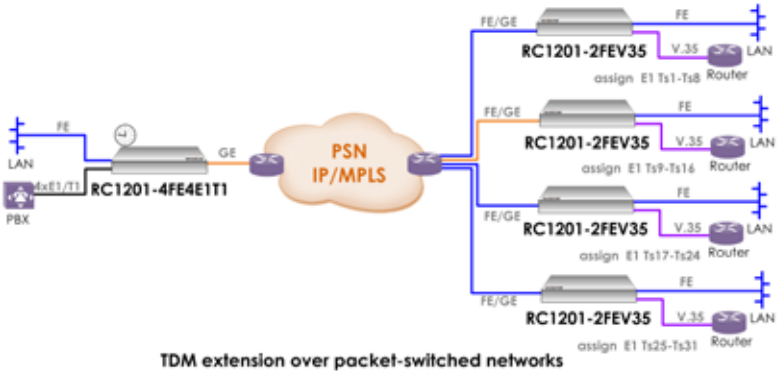
The RC1201 product series are TDM over IP gateways that connect TDM networks across Packet-switched networks such as MPLS, Ethernet and UDP/IP. By deploying in pairs, it provides PSN extension for any user with a standard E1/T1 interface circuit.

It supports CESoPSN, SAToP and TDMoIP TDM over Ethernet payload mechanisms and equipped with large and configurable jitter buffers, up to 255ms, to compensate for the delay variation introduced by the PSN. Four selectable clock modes are available: internal clock from a local oscillator, recovered clock from E1/T1 line site, recovered clock from packet network and external clock via the dedicated ports. The device incorporates OAM functionality and various troubleshooting tools to monitor pseudowire link status from the remote unit and local site. RC1201-4FE4E1T1-O-AC/DC uses a higher end accurate crystal oscillator (OCXO) to provide higher precision clocking attributes.

The TDM over IP gateway supports both out-of-band and in-band management. The device can also be configured locally via CLI, telnet, SNMP or Raisecom network management system RC NView NNM.



Point-to-point application, connecting E1 and V35 across packet-switched networks



TDM extension over packet-switched networks

Chapter 7 - CWDM Product Family

As a global leading provider of last mile access for cost-effective provisioning of high speed data, voice and video services in Metropolitan Area scenarios, Raisecom Technology offers carriers, telecom operators and service providers a winning deployment strategy to speed up the return on investment of access network equipment, as well as, generate additional revenue streams from enhanced services.

The Raisecom CWDM product family allows carriers the ability to selectively increase fiber utilization and to quickly deploy additional bandwidth and services at a fraction of the investment required to deploy new fiber. It provides a low cost protocol-transparent platform with ultra large bandwidth, satisfying enterprise customers' requirements and providing the carrier increased margins.

OPCOM series CWDM systems are capable

of transporting multiple independent services (up to 10G) from 2, 4, 8 to 18 channels over one single pair of fiber or single strand fiber, without interfering each other. They have enabled carriers to expand their transportation capability, smoothly and conveniently, while avoiding unnecessary excavation from new fiber installations.

OPCOM100 2/4-channel CWDM series

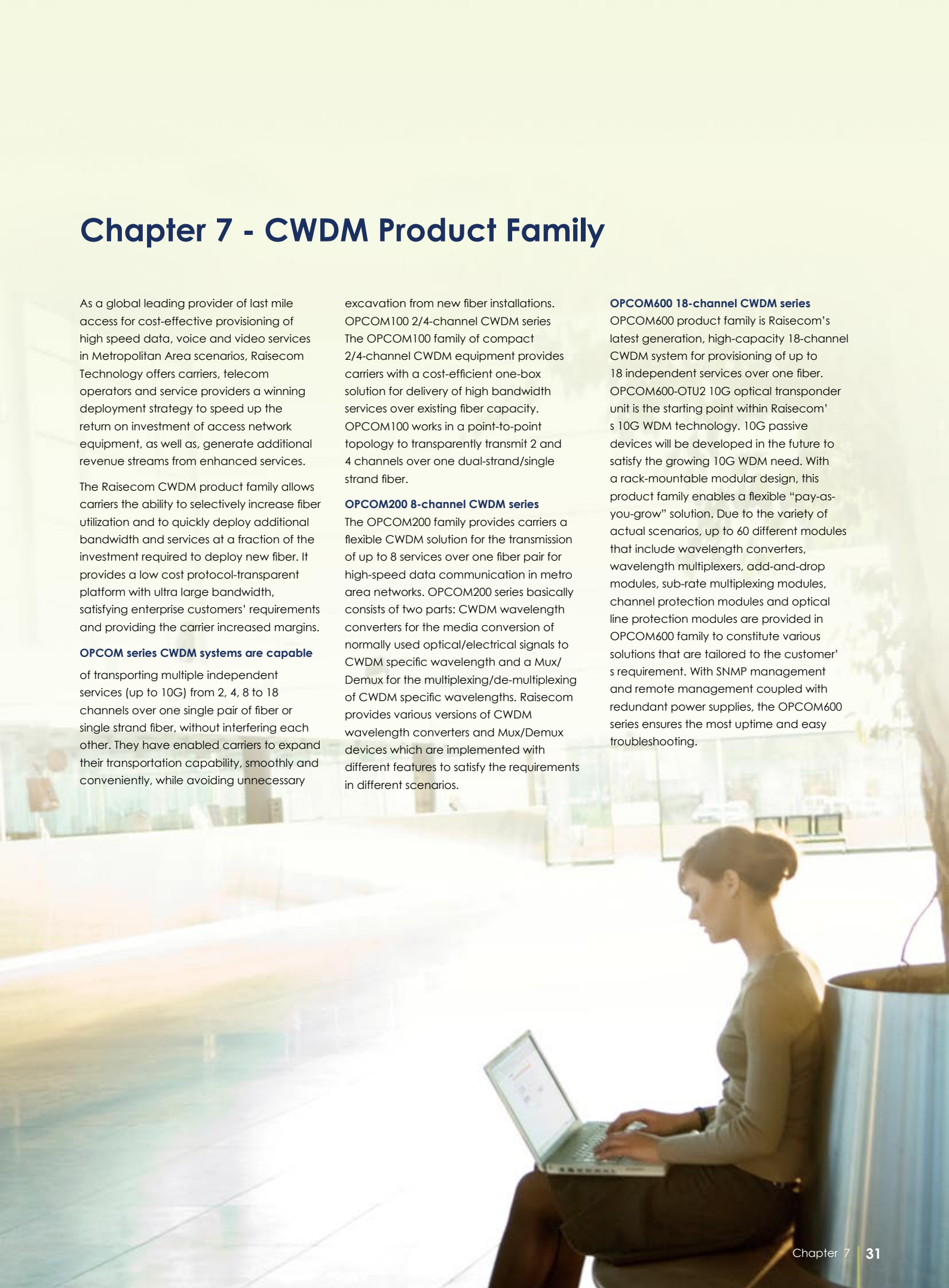
The OPCOM100 family of compact 2/4-channel CWDM equipment provides carriers with a cost-efficient one-box solution for delivery of high bandwidth services over existing fiber capacity. OPCOM100 works in a point-to-point topology to transparently transmit 2 and 4 channels over one dual-strand/single strand fiber.

OPCOM200 8-channel CWDM series

The OPCOM200 family provides carriers a flexible CWDM solution for the transmission of up to 8 services over one fiber pair for high-speed data communication in metro area networks. OPCOM200 series basically consists of two parts: CWDM wavelength converters for the media conversion of normally used optical/electrical signals to CWDM specific wavelength and a Mux/Demux for the multiplexing/de-multiplexing of CWDM specific wavelengths. Raisecom provides various versions of CWDM wavelength converters and Mux/Demux devices which are implemented with different features to satisfy the requirements in different scenarios.

OPCOM600 18-channel CWDM series

OPCOM600 product family is Raisecom's latest generation, high-capacity 18-channel CWDM system for provisioning of up to 18 independent services over one fiber. OPCOM600-OTU2 10G optical transponder unit is the starting point within Raisecom's 10G WDM technology. 10G passive devices will be developed in the future to satisfy the growing 10G WDM need. With a rack-mountable modular design, this product family enables a flexible "pay-as-you-grow" solution. Due to the variety of actual scenarios, up to 60 different modules that include wavelength converters, wavelength multiplexers, add-and-drop modules, sub-rate multiplexing modules, channel protection modules and optical line protection modules are provided in OPCOM600 family to constitute various solutions that are tailored to the customer's requirement. With SNMP management and remote management coupled with redundant power supplies, the OPCOM600 series ensures the most uptime and easy troubleshooting.



OPCOM100-2

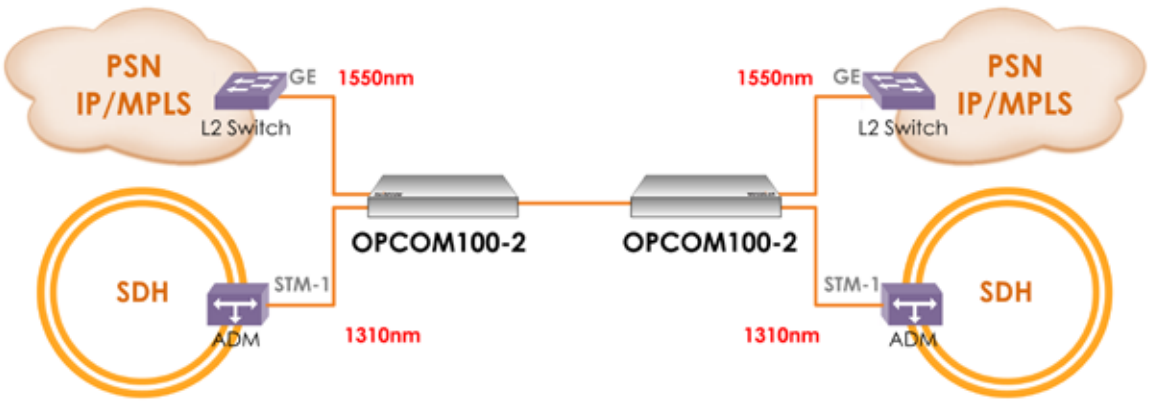
OPCOM100-2

2-Channel WDM System

- Up to10G per channel
- Service/protocol transparent
- Expansion slot for wavelength converter card
- Mini type for flexible out-door application
- Enhanced type for longer distance transmission
- Plug-and-play

Raisecom OPCOM100-2 series 2-channel CWDM devices provide carriers and service providers a cost-effective solution for the transmission of 2 services (up to 10G per service) over one fiber pair in a point-to-point topology. An expansion slot is included for when media conversion is required. There are three versions of the OPCOM100-2 2-channel CWDM devices: OPCOM100-2, OPCOM100-2S and OPCOM100-2E. OPCOM100-2 utilizes 1310/1550nm wavelengths for the 2 services transmission over one fiber pair, OPCOM100-2E is enhanced version of OPCOM100-2 for long distance transmission by utilizing 1490/1550nm wavelengths and OPCOM100-2S is a hardened type for outdoor installation.

OPCOM100-2 is a 2-channel CWDM product that transmits one 1310nm service and one 1550nm service over one fiber pair. It is transparent to services, so there is no limitation regarding the service rate. To make it more flexible for various applications, OPCOM100-2 is also equipped with an expansion slot for media converters to do Ethernet copper to fiber conversion or optical wavelength conversion. OPCOM100-2 can work without a power supply if there is no need for media conversion.



Point-to-point 2-channel CWDM solution

OPCOM200-OTU1

OPCOM200-2GEM

OPCOM200-OCP

OPCOM200-OMD8

OPCOM200-OAD1D

OPCOM200-OTU1 OPCOM200-2GEM OPCOM200-OCP OPCOM200-OMD8 OPCOM200-OAD1D

8-Channel CWDM Series

- Up to 2.5Gbps per channel
- 8 CWDM wavelengths over a single-strand fiber
- High Flexible design of MUX/DE-MUX and CWDM wavelength conversion card
- Various MUX/DE-MUX options including passive, hardened, and manageable modular type for different applications
- Various CWDM wavelength converters including fast Ethernet, gigabit Ethernet , and optical converter for satisfying different requirements
- Optical add and drop module for chain and ring topologies
- Channel, path or line protection schemes for the most uptime

OPCOM200-OTU1 / CWDM Optical Wavelength Converter Card

- Cost-effective optical wavelength conversion to CWDM specific wavelength
- Optional multimode, single mode or single strand fiber are supported
- Service transparent and speed downward-compatible
- Fault propagation of both customer site and line site
- Line-in/Line-out loop back for easy fault propagation
- Hybrid supported with other RC series media converters in RC002-16 chassis
- Hot-swappable
- 3R function: Re-shaping, Re-amplification and Re-timing
- Fault-pass through from line site to customer site

OPCOM200-2GEM / 2GE to 1 Wavelength Sub-Rate Multiplexer

- Multiplex 2 independent GE services on one CWDM channel
- Wire-speed GE service transportation
- Support MTU up to 9600 Bytes
- Network and client side loopback function
- Support ALS function
- Hot-swappable SFP optical interface for both network and client sides
- Support out-of-band remote management by transmitting managemen

OPCOM200-OCP / Optical Channel Protection Card

- Up to 2.5Gbps per channel
- Optimal surveillance of fiber line status
- Redundant data path for a particular service channel
- Protocol/service transparent
- 3R function: Re-shaping, Re-timing and Re-amplifying
- Fault Pass Through
- SFP connector for both user site and CWDM site

OPCOM200-OMD8 / 8-Channel CWDM Mux/Demux

- Up to 2.5Gbps per channel
- Multiplexing and De-multiplexing 4 or 8 CWDM channels over one fiber pair
- Multiplexing and De-multiplexing 4 CWDM channels over single-strand fiber
- Hardened version features water-proof and dust-proof capabilities for outdoor installation
- Expanded channel for analog 1310nm services
- Manageable MUX/DE-MUX with modular design for integrated installation with the CWDM wavelength converters in the same chassis
- Pay as service grows

OPCOM200-OAD1D / Optical Add and Drop Module

- Add or drop a CWDM specific wavelength for hub-and-spoke or ring topology
- Single-strand fiber is available for line site
- Hardened type for outdoor installation
- Low insertion loss
- Pay as service grows

OPCOM200 8-channel CWDM product family is a cost-effective and highly flexible solution for optimizing the utilization of existing fiber optics. This family is capable of operating on both dual-strand fiber and single-strand fiber to support point-to-point, hub-and-spoke and ring topologies for various applications. OPCOM200 can also be equipped with channel or path/line protection, allowing the automatic switching of the operations to the secondary line in case the primary line is interrupted. This enables the most uptime for critical data transmission. Other enhanced features include 3R function - remote management, fault propagation, line-in/line-out loop back, fault pass through, rate-limiting, etc.

OPCOM200 family basically consists of three parts: CWDM wavelength converter for the media conversion of normally used optical/electrical signals to CWDM specific wavelengths, MUX/DEMUX for the multiplexing/de-multiplexing of CWDM specific wavelengths and protection modules for channel, path/line protection.

RC006

OPCOM600-OTU1-1

OPCOM600-OTU1-2

OPCOM600-OTU1-4

OPCOM600-OAU-1B

OPCOM600/RC006
OPCOM600-OTU1-1
OPCOM600-OTU1-2
OPCOM600-OTU1-4
OPCOM600-OAU-1B
OPCOM600-2GEMP
OPCOM600-OMU18
OPCOM600-ODU18
OPCOM600-OLP-A
OPCOM600-OLP-B

18-Channel 10G CWDM Series

- Up to10Gbps per channel
- 18 CWDM wavelengths over a single-strand fiber
- High performance separated design of MUX/DE-MUX and CWDM wavelength conversion cards
- Various MUX/DE-MUX units including passive, hardened and manageable modular type for different applications
- Various CWDM wavelength converters including fast Ethernet, gigabit Ethernet, and optical converter for satisfying different requirements
- Optical add and drop module for chain and ring topologies
- Channel, path or line protection schemes for the most uptime

OPCOM600-OTU1 / CWDM Optical Wavelength Converter Card

- Cost-efficient optical wavelength conversion to CWDM specific wavelength
- Optional multimode, single mode or single strand fiber are supported
- Service transparent and speed downward-compatible
- Fault propagation of both customer site and line site
- Line-in/Line-out loop back for easy fault propagation
- Hybrid supported with other RC series media converters in RC006-12 chassis
- Hot-swappable
- 3R function: Re-shaping, Re-amplification and Re-timing
- Fault pass through from line site to customer site

OPCOM600-2GEMP

OPCOM600-OMU18

OPCOM600-ODU18

OPCOM600-OLP-A

OPCOM600-OLP-B

OPCOM600-OAU-1B / EDFA Boost Optical Amplifier

- Erbium-Doped Fiber Amplifier for long-haul fiber transmission
- Working wavelength 1528 ~ 1562nm
- Output power up to +13 ~ +17dBm
- Amplifies one or two optical signals on one card
- Support ALS function
- Optical power monitoring for both input and output
- Support trap notification for temperature, optical loss, and etc.

OPCOM600-2GEMP / 2GE to 1 Wavelength Sub-Rate Multiplexer

- Multiplex 2 independent GE services on one CWDM channel
- Wire-speed GE service transportation
- Two auxiliary 10/100Mbps data channels
- 1+1 protection on transmission line
- Support MTU up to 9600 Bytes
- Network and client side loopback function
- Support ALS function
- Hot-swappable SFP optical interface for both network and client sides
- Support out-of-band remote management by transmitting management
- information along with GE traffics

OPCOM600-OMU18/ODU18 / 18-Channel Mux/Demux

- Up to10Gbps per channel
- Multiplexing and De-multiplexing up to 18 CWDM channels over one fiber pair
- Multiplexing and De-multiplexing up to 8 CWDM channels over single-strand fiber
- Manageable MUX/DEMUX with modular design for integrated installation with the CWDM wavelength converters in RC006-12 chassis
- Pay as service grows

OPCOM600-OLP / Optical Protection Card

- Redundant data path for the entire transmission line
- Provides 1+1 or 1:1 optical line protection
- Automatic or manual switchover mode
- Switchover time less than 50ms
- Protocol/service transparent
- 3R function: Re-shaping, Re-timing and Re-amplifying
- Support Automatic Laser Shutdown function
- Fault Pass Through

OPCOM200 8-channel CWDM product family is a cost-effective and highly flexible solution for optimizing the utilization of existing fiber optics. This family is capable of operating on both dual-strand fiber and single-strand fiber to support point-to-point, hub-and-spoke and ring topologies for various applications. OPCOM200 can also be equipped with channel or path/line protection, allowing the automatic switching of the operations to the secondary line in case the primary line is interrupted. This enables the most uptime for critical data transmission. Other enhanced features include 3R function - remote management, fault propagation, line-in/line-out loop back, fault pass through, rate-limiting, etc.

OPCOM200 family basically consists of three parts: CWDM wavelength converter for the media conversion of normally used optical/electrical signals to CWDM specific wavelengths, MUX/DEMUX for the multiplexing/de-multiplexing of CWDM specific wavelengths and protection modules for channel, path/line protection.

OPCOM600-OTU2/OTU2E

OPCOM600-8GEM/8GEME

OPCOM600-4GEA/4GEAE

OPCOM600-OTU2 OPCOM600-OTU2E OPCOM600-8GEM OPCOM600-8GEME OPCOM600-4GEA OPCOM600-4GEAE

Optical Packet Network

- 9.95G~11.09G bandwidth
- Standard services (STM64/OC-192, 10GE-WAN/10GE-LAN, OTU2/OTU2E, FC-8G/FC-10G) supported
- 3R function for standard speed services
- GEFC, EFEC and ESC supported
- Bi-direction fault-pass/link-pass-through and ALS(auto-laser-shutdown) function

OPCOM600-OTU2, 2E / Optical Transponder Card

- 9.95G~11.09G service optical wavelength converting and OTN frame creation
- STM64/OC-192, 10G-WAN/10GE-LAN, FC-8G/FC-10G supported
- 3R function for standard speed service
- Both client side and line side support DWDM/CWDM XFP, hot swappable
- Bi-direction fault-pass/link-pass-through function
- Auto laser shutdown function
- 1 channel line-client wavelength converting and 1 channel single directional wavelength converting on EXT port

OPCOM600-8GEM, 8GEME / 8GE Sub-Rate Multiplexer

- Multiplex 8 independent GE services on one CWDM channel
- GE service at client side, hot swappable SFP interface, both fiber and copper SFPs supported
- XFP interface at line side, hot swappable UXFP or CXFP
- Bi-direction fault-pass/link-pass-through function
- Auto laser shutdown function
- In-service remote management
- Support ALS function

OPCOM600-4GEA, 4GEAE / Gigabit Ethernet Add-and-Drop Card

- 4 gigabit Ethernet add-and-drop multiplexer, add/drop up to 4 GE channel
- GE interface at client side, hot swappable fiber/copper SFP
- 10G XFP interface at client side, hot swappable
- Bi-direction fault-pass/link-pass-through function
- Auto laser shutdown function
- Add/drop direction configurable. Client interface can be configured to west/east/transparent transmission mode
- In-service remote network management

OPCOM600 OPN products are designed to provide flexible and cost-efficient solutions for growing 10G bandwidth needs. With OPCOM600-OTU2, OPCOM600-8GEM and OPCOM600-OMU18/ODU18, up to 144(8 x 18) channel 144G Ethernet traffic can be multiplexed into one pair of fiber, while OPCOM600-4GEA can add and drop one or two channel in a point-to-multiple-point application. All OPN products support in-service remote network management. The enhanced part number, including OPCOM600-OTU2E, OPCOM600-8GEME and OPCOM600-4GEAE, will support GEFC & EFEC & ESC.

Chapter 8 - MSAP&SDH

MSAP

Raisecom's Multi-Service Access Platform offers a comprehensive deployment strategy for operators, carriers and ISPs with SDH-based applications. The MSAP product family consists of many devices that provide various services such as voice, data, video, and LAN over PDH, SDH and Ethernet circuits, with carrier class reliability and full hardware redundancy, ensuring maximum service uptime.

MSAP product family also provides maximum flexibility by incorporating fiber optic, copper and SHDSL link options over the last mile access. When deploying Raisecom's customer premise devices connected to the MSAP, carriers can eliminate the need for external modems and modem racks in the last mile. Furthermore, MSAP system provides a future proof solution with easy and convenient migration options to Gigabit Ethernet based Next Generation transportation network.

SDH

Synchronous Digital Hierarchy (SDH) is still the dominant transmission technology, in terms of tremendous investment and countless users everywhere. It will continue to play an important role for the coming years as other technologies cannot quite match the capabilities comparable to SDH reliability, dependability and quality of service. Although many operators and carriers are beginning to migrate from SDH to Ethernet/IP technology, SDH is still considered as the first choice for voice and delay sensitive services.

iPN2100-12

iPN2100-NMS

iPN2100

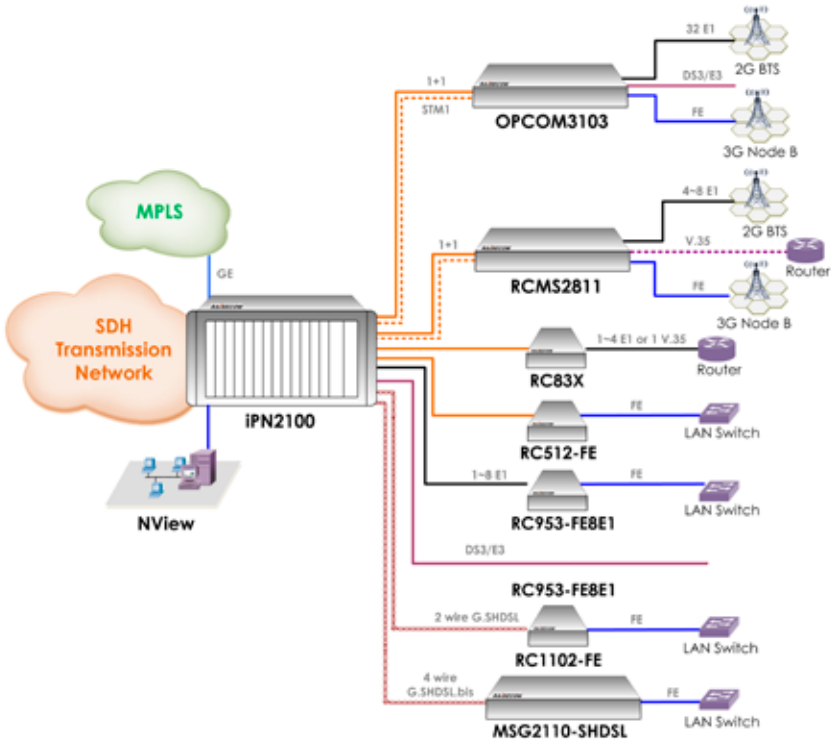
Multi Service Access Platform

- 4 x STM-1/STM-4 uplink interfaces with protection switching
- 40xSTM1/320xE1 electrical/80xE1 optical/40xFiberMux/80 Ethernet at tributary links
- 1 VC4 and 2 GE capacity at each tributary slot, while 4 VC4 at the 2nd &4th slots
- Up to 8 GE uplink interfaces in 2 Gigabit Ethernet aggregation slots
- Redundant protection of SDH & GbE aggregation cards
- Redundant protection of multiservice FiberMux cards
- Redundant AC and DC power supplies
- Four levels of cross connection granularity at 64kbps, VC12, VC3 and VC4
- 20x20 VC4 (STM1 card) or 32x32 VC4 (STM4 card) cross connection capacity
- 48x48 E1 cross connection capacity at 64kbps
- 1+1 MSP and 1+1 LPP protection at aggregation slots
- 1+1 MSP protection at 2nd and 4th tributary slots
- EoSDH supports GFP/LAPS encapsulation, and VCG/LCAS;
- EoPDH supports inverse multiplexing and LCAS technology
- Multiservice FiberMux tributary slot for connecting NxE1 + FF/GbE traffics
- Auto Laser Shutdown protection and Dying Gasp
- Support external clock 2Mbps/2MHz, line clock, and SSM
- OAM for remote CPE configuration and management
- SNMP management via in-band or out-of-band network channels

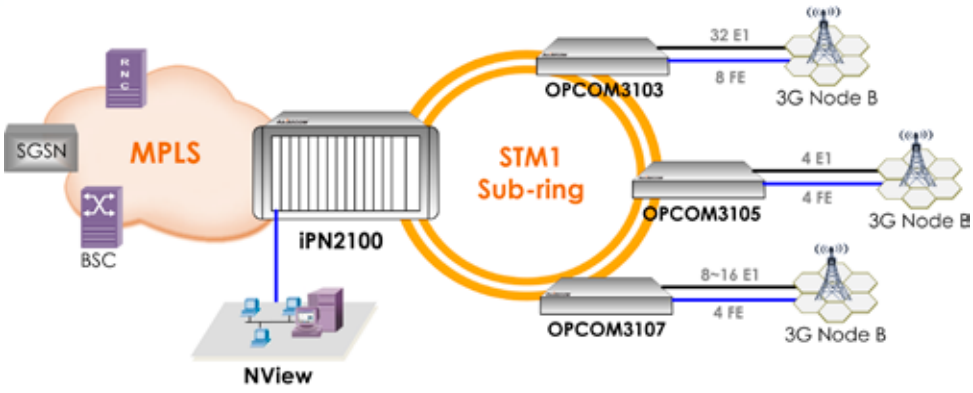
iPN2100 MSAP is an aggregation device that incorporated dual TDM and IP cores. It provides 4 STM-1/STM-4 and 8 GbE on the line side, and various tributary interfaces such as STM-1, FiberMux, E1, E3, DS3, FE, V.35, V.24, and G.SHDSL.bis at the client side. Therefore, iPN2100 is suitable for deployment in public/private and utility networks as a unified multiservice access solution.

iPN2100 can simplify E1 deployments and reduce OPEX by providing integrated E1 cards while eliminating massive E1 cables compared to tradition E1 service extraction from STM-1/STM-4 circuits. It is also very convenient to implement LAN service extensions by utilizing G.SHDSL.bis to aggregation client LAN services into VC12 or GbE for different transportation networks. iPN2100 offers both SDH OAM and Raisecom proprietary management options to implement centralized network management.

iPN2100 provides a cost effective total solution for carriers to extend coverage to potential customers and offering new services while reducing CAPEX on new devices. Diversified interface options and hardware redundancy ensure flexible applications from SME to a wide range of carrier solutions.



Aggregating various services via Raisecom CPE to STM-1/STM-4 and Gigabit Ethernet uplinks



iPN2100 MSAP provides Mobile Backhaul through multiple STM-1 sub-rings, transmitting voice and data traffic on E1 and Fast-Ethernet simultaneously

OPCOM3500E-6

OPCOM3500E-6

Multi Service Access Platform

- 4 STM1 aggregation interfaces
- 8x8 VC4 and 504x504 VC12 cross-connection
- Redundant AC or DC power supplies
- In-band and out-of-band SNMP/Console management

OPCOM3500E-NMS-STM1

OPCOM3500E-6 is a 3U-high small-size MSAP, providing similar functionalities as OPCOM3500E-12. In addition to inherit service cards from OPCOM3500E-12, it has a special NMS card (OPCOM3500E-NMS-STM1), which includes two additional STM-1 interfaces that act as a backup for the STM-1 aggregation card. OPCOM3500E-6 can support up to 128 electrical E1, 32 optical E1, 16 FiberMux, 32 G.SHDSL.bis, 32 Fast Ethernet, and 2 Gigabit Ethernet ports.


OPCOM3500E-2STM4/1-M


OPCOM3500E-4STM1-S


OPCOM3500E-STM1-S

OPCOM3500E-2STM4/1-M
OPCOM3500E-4STM1-S
OPCOM3500E-STM1-S
OPCOM3500E-3DS3E3
OPCOM3500E-32E1(-BL)
OPCOM3500E-16E1(-BL)

STM-4/STM-1 aggregation card, STM-1 tributary card and DS3/E3/E1 tributary card


OPCOM3500E-3DS3/E3


OPCOM3500E-32E1


OPCOM3500E-16E1

STM-1/STM-4 aggregation card:

- 2 SFP based STM-1/STM-4 optical interfaces
- Protection functionality available on the 6th -7th slots
- 1+1 linear MSP and LPP on aggregation slots
- 1+1 MSP protection on the 2nd and 4th tributary slots
- Support VC12/VC3/VC4 cross connection
- Up to 20x20 VC4 (STM-1) or 32x32 VC4 (STM-4) cross connection
- D1~D3 or D4~D12 or D1~D12 DCC network management channel
- 2Mbit external clock and SSM clock options
- Auto-Laser-Shutdown and Dying Gasp
- Build-in E1 BERT function
- Local/remote software online upgrade

STM1 Tributary module:

- 2 SFP based interfaces on OPCOM3500E-STM1-S
- 4 SFP based interfaces on OPCOM3500E-4STM1-S
- Independent or 1+1 protection operation mode
- Support 63 VC12 in normal mode
- Up to 252 VC12 in extension mode while 4STM1-S card in Slot 2&4
- 1+1 linear MSP and LPP protection
- Support DCC and optional 3/9/12 bytes modes
- 4STM1-S card supports VCC in-band network management

DS3/E3 card:

- Software configurable 3 DS3/E3 optical and electrical interfaces
- 3 working modes configurable by DIP-switch:
  1. SDH working mode
  2. 1+1 line interface protection mode
  3. Optical modem working mode
- Build-in DS3/E3 BERT
- Optical interface supports management of remote devices
- Internal and external loopback on electrical and optical interfaces

E1 card:

- 16/32 electrical E1 interfaces on each card
- Direct mapping of E1 signal to TDM bus on backplane
- Local/remote alarm indications on the front panel
- Internal/external loop-back commands for each tributary

OPCOM3500E-2STM4/1-M and the NMS cards consist of the basic system of the MSAP. OPCOM3500E-STM1-S and 4STM1-S cards provide 2 and 4 STM-1 optical interfaces respectively at the tributary side. They can be connected to the remote OPCOM3100 series mini-SDH devices, offering complete solutions for point-to-point, daisy chain and ring network deployment.

OPCOM3500E-3DS3/E3 card provides DS3/E3 tributary interfaces with both optical and electrical options. It works connected to the remote RC802-DS3E3 FiberMux in line protection or optical modem working mode.

OPCOM3500E-16E1(-BL) and 32E1(-BL) cards provide 16/32 E1 interfaces respectively and introduce 320 E1 digital cross connection capability by replacing the hardware DDF cross connection. All E1 lines from different directions can be simply cross connected by software configurations.

iPN2100-PTU-4GE

MS3-ESW-2GE-T/X

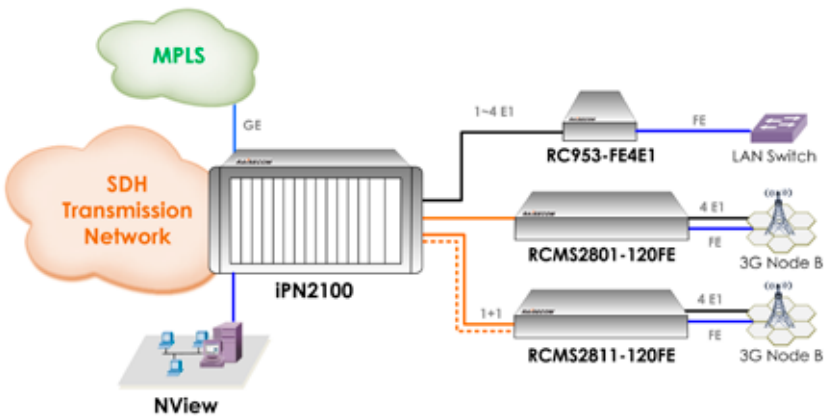
iPN2100-PTU-4GE
MS3-ESW-2GE-T/X

Universal L2 Ethernet Switch Card in MSAP

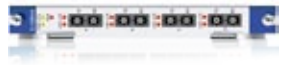
- 9-port GbE to backplane and 4-port SFP GbE on front panel
- Up to 88Gbps switching fabric
- Designated in Slot 9 and 10, supporting 1+1 card protection
- iPN2100-PTU-4GE is only available in iPN2100
- MS3-ESW-2GE is only available in OPCOM3500E-6 & RC3000-6 chassis
- Ethernet MTU up to 13000 bytes (Jumbo frame)
- Rate limiting from 62Kbps to 1000Mbps
- Port-based broadcast, multicast and DLF storm control
- Support Link Aggregation function
- 4K 802.1q VLAN and Q-in-Q (double tag), ACL
- Support 802.1D STP, 802.1s RSTP & 802.1w MSTP
- ITU-T G.8031 & G.8032 Ethernet linear/ring protection
- Standard IEEE 802.3ah and 802.1ag OAM
- 802.3x (full duplex) and back pressure (half duplex) flow control
- 8K MAC address table and 30 static MAC addresses
- MAC address learning function can be enabled/disabled per port
- Configurable 0-3825 seconds MAC aging time
- QoS functions, 4 egress queues
- Port isolation protection
- Transparent forwarding of BPDU, LACP and IEEE802.1x frames
- Ethernet port-based loopback detection
- Support Synchronous Ethernet for packet-based Mobile Backhaul
- Support BC and TC modes of IEEE1588v2

iPN2100-PTU-4GE is a 9GbE + 4GbE Ethernet Switching card available in iPN2100 chassis, switching and forwarding Ethernet services from tributaries and the network. This card should only be inserted in the designated Slot 9 & 10 with 1+1 card protection. The tributary-side GbE ports are connecting tributary Slot 1-5 and 8-12 via the backplane.

MS3-ESW-2GE series cards have similar functions as iPN2100-PTU-4GE but smaller size designed for the 3U chassis OPCOM3500E-6 MSAP, RC3000-6 PCM and RC006-6 chassis. This card has a designated Slot 6 on the right bottom corner of the chassis.



iPN2100-PTU-4GE switches and aggregates tributary Ethernet services to Metro Ethernet backbone



OPCOM3500E-120Hx4

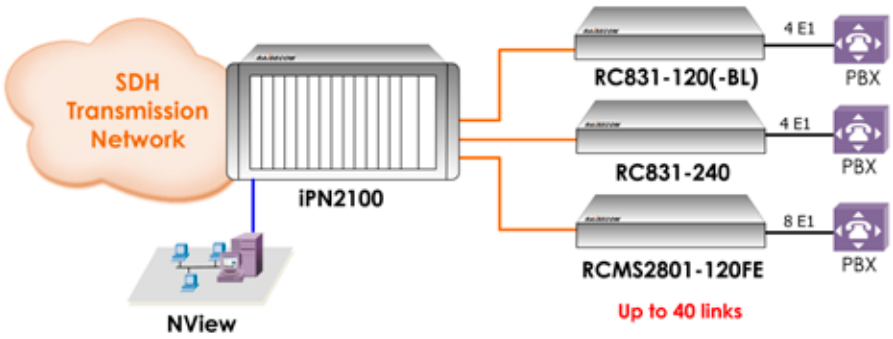
OPCOM3500E-240Hx2

OPCOM3500E-120Hx4
OPCOM3500E-240Hx2

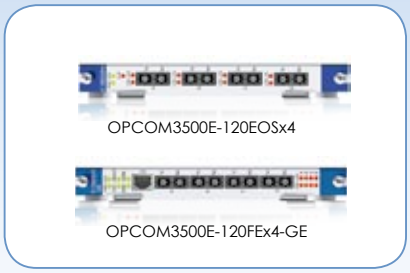
FiberMux Card in MSAP

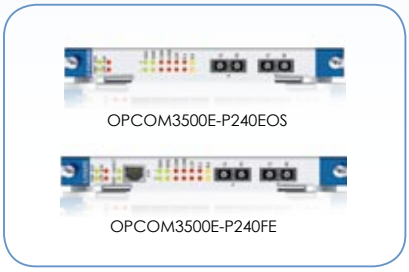
- Deliver multiple E1s in each fiber optic link
- Mapping E1 signal to backplane directly
- Auto Laser Shutdown and Dying Gasp
- Local and remote alarm indications on front panel
- Inside and outside loopback command for each tributary
- Remote RC83x and RCMS28xx series FiberMux are managed via fiber optic overhead channel

OPCOM3500E-120Hx4 has 4 independent fiber optic interfaces, each of which has 4xE1 capacity. Similarly, OPCOM3500E-240Hx2 has 2 independent fiber optical interfaces and up to 8xE1 capacity on each. These cards connect remote RC83x and RCMS28xx series FiberMux to provide multiple E1 + FE/GbE services with single strand or dual-strand fiber.



MSAP provides fast and cost effective E1 extraction and extension from central office to multiple customer premise locations.





OPCOM3500E-120EOSx4
OPCOM3500E-120FEx4-GE
OPCOM3500E-P240EOS
OPCOM3500E-P240FE

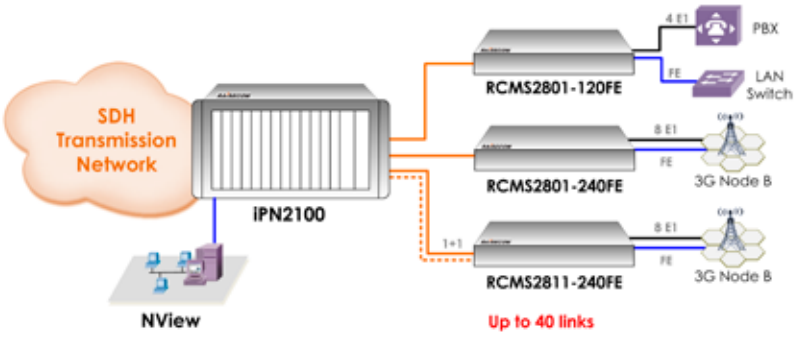
Multi-Service FiberMux Tributary Card in MSAP

- Deliver multiple E1s + wire-speed Fast-Ethernet on each fiber link
- Provide 1+1 fiber protection on P240EOS and P240FE cards
- Mapping E1 signal to backplane directly
- Fast Ethernet traffic mapping to NxVC12 group by GFP/LAPS on 120EOSx4 and P240EOS cards
- Fast Ethernet traffic switched to GbE uplinks on 120FEx4-GE card
- Fast Ethernet traffic landed on front panel interface on P240FE card
- Auto Laser Shutdown and Dying Gasp functions
- Local and remote alarm indications on front panel
- Inside and outside loopback command for each tributary
- Manage remote RCMS28xx series FiberMux via fiber optic overhead channel

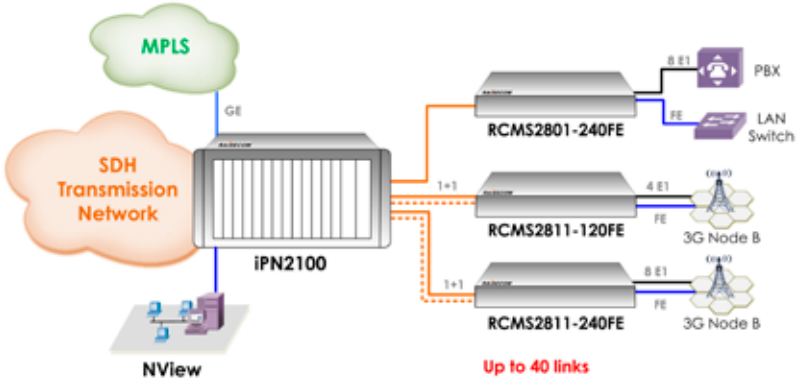
The tributary cards in iPN2100 are deployed in point-to-point applications connected to the remote RCMS28xx multiservice FiberMux equipment.

OPCOM3500E-120EOSx4 and P240EOS cards support up to 1 to 4 remote RCMS2801/2802 series multiservice FiberMux. Each optical interface supports 1-4 E1 and 1 wire-speed Fast Ethernet services. E1 signals are cross connected and aggregated by SDH uplink cards; while Fast Ethernet service is switched to pre-defined VCG by built-in Ethernet over SDH encapsulation.

OPCOM3500E-120FEx4-GE and P240FE support 1-4 lines of multiservice FiberMux channels, each of which supports 1-8 E1s + 1 wire-speed Fast Ethernet services. E1s are cross connected and aggregated by SDH uplink cards. The Fast Ethernet on the 120FEx4-GE card can be switched 2 optional ways; one is 10/100/1000M electric interface on its front panel, while the other is Fast Ethernet channel on the backplane and further to the GbE aggregation card SUB-ESW-2GE. The Fast Ethernet of the P240FE card will be landed on its front panel FE interface directly.

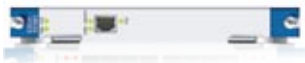


Multi-service cards working with remote RCMS to deliver 1~8 E1s and aggregate wire-speed Fast Ethernet into SDH transportation



Multi-service cards working with remote RCMS to deliver 1~8 E1s and aggregate wire-speed Fast Ethernet into Metro Ethernet/IP transportation

OPCOM3500E-EOP-FEE1x8



OPCOM3500E-EOP-FE16E1

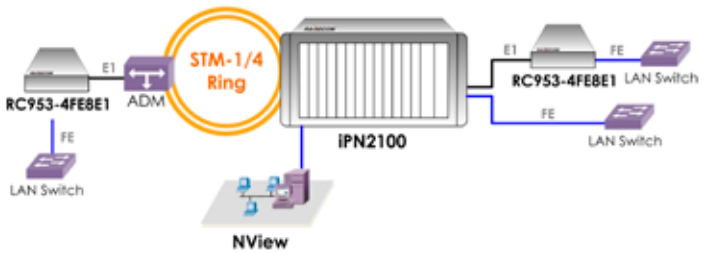
OPCOM3500E-EOP-FEE1×8
OPCOM3500E-EOP-FE16E1

EoPDH (E1) Card in MSAP

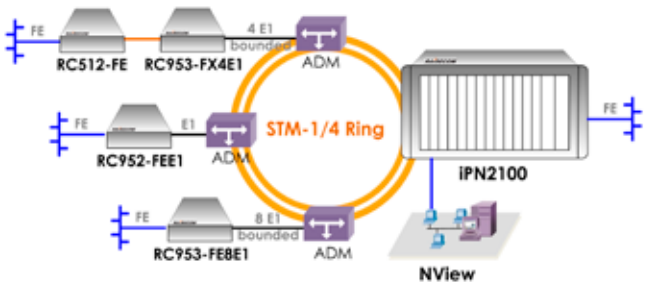
- 8 x fixed 100Mbps Ethernet interfaces on EOP-FEE1x8 card
- 1 x 10/100Mbps Ethernet interface on EOP-FE16E1 card
- Three EoPDH(E1) applications supported by EOP-FE16E1:
  1. Aggregating up to 16E1 (VC12) to 1 FE on front panel;
  2. Inverse multiplexing 8 bonded E1 (VC12) to 1 FE to deliver 16Mbps bandwidth;
  3. Aggregating multiple independent streams to 1 FE, each based on max 8 single/bonded E1 (VC12)
- Mapping E1 signal to backplane directly
- E1 interface supports framed and unframed mode
- The MTU of Ethernet interface is 1632 bytes
- IEEE 802.1q VLAN and Q-in-Q functions
- Configurable MAC address learning and aging per port
- Support LCAS function based on E1 link quality
- Build-in BERT function of E1 link
- Transmitting, receiving, packet flow and error packets statistics per E1

OPCOM3500E-EOP-FEE1x8 provides 8 independent built-in EoPDH channels. When couple with 8 media converters, Fast Ethernet traffic is encapsulated into VC12 by the Raisecom proprietary HDLC protocol, cross connected via the backplane, aggregated and transmitted over the SDH network.

OPCOM3500E-EOP-FE16E1 is an EoPDH (E1) tributary card with 16E1 capacity. The three working modes aggregating, inverse multiplexing, and aggregating plus inverse multiplexing provides extremely flexible ways of delivering Fast Ethernet services over legacy E1 circuits.



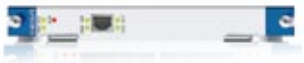
EOP-FEE1x8 tributary card encapsulates 8 Fast Ethernet into 8 VC12 respectively, providing 2Mbps bandwidth throughput on each link



OPCOM3500E-EOP-FE16E1 aggregates Ethernet services through bonded VC12 (E1), and manages RC95x and RC512 converters remotely

OPCOM3500E-EOS-4FE

OPCOM3500E-EOS-8FE



OPCOM3500E-8EOS-FE

OPCOM3500E-4EOS-4FE

OPCOM3500E-EOS-4/8FE
OPCOM3500E-8EOS-FE
OPCOM3500E-4EOS-4FE

EoSDH Tributary Card in MSAP

OPCOM3500E-EOS-4/8FE

- 4/8 Fast Ethernet electrical ports on front panel
- Ethernet over SDH on each Ethernet port
- Rate limiting at NxVC12 granularity, sharing up to 63 VC12
- GFP/LAPS encapsulation, LCAS function
- Support remote management of Raisecom media converter

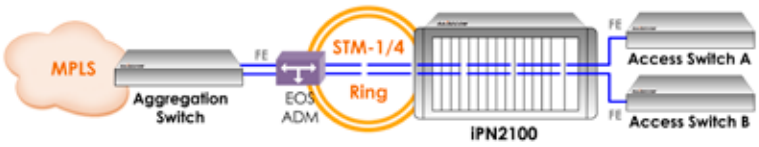
OPCOM3500E-8EOS-FE & OPCOM3500E-4EOS-4FE

- GFP/LAPS encapsulations, VCAT and LCAS functions
- Ethernet MTU up to 1632 bytes
- Rate limiting from 62Kbps to 100Mbps
- 8K MAC address table
- 4K 802.1q VLAN and double tagging (Q-in-Q)
- Configurable MAC aging time between 0 to 3825 seconds
- Ethernet interface statistics function
- QoS function, 4 egress queues and CoS based priority
- Port-based broadcast, multicast and DLF storm control
- Support Link Aggregation function
- IEEE 802.3x (full duplex) and back press (half duplex) flow control
- Transparent forwarding of BPDU, LACP and IEEE802.1x frames
- Ethernet port-based loopback detection

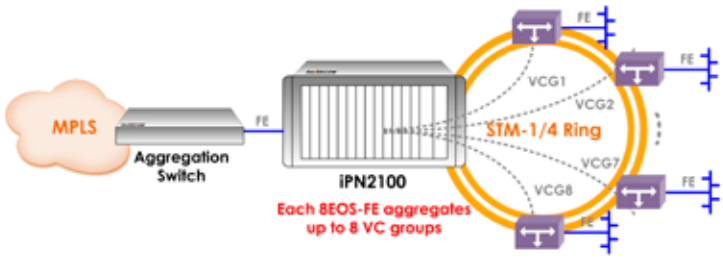
OPCOM3500E-EOS-4/8FE tributary cards provide 4/8 interfaces to work with remote Fast Ethernet media converters respectively. The Ethernet traffic is encapsulated by GFP/LAPS protocol at NxVC12 granularity and transmitted over the SDH network.

OPCOM3500E-8EOS-FE takes 8 EoSDH services from 8 VC groups on the backplane and aggregates them to the front panel FE interface or switches to GbE aggregation card SUB-ESW-2GE. Each EoSDH VCG has NxVC12 capacity, while the max is 63 VC12.

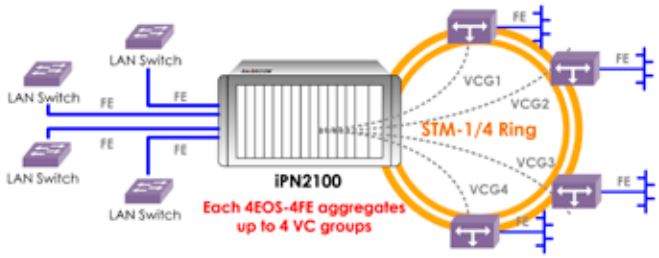
OPCOM3500E-4EOS-4FE is incorporated with a 9-port Ethernet L22 switch chipset, providing 4 10/100BaseTx interfaces on the front panel which can be mapped into 4 VC groups respectively. The 4 VC groups have a total capacity of 63 VC12. It could be flexibly configured as 1 Fast Ethernet interface and mapped with 4 VC groups or 4 Fast Ethernet interfaces within one VC group.



OPCOM3500E-EOS-8FE provides max 80 ports of Fast Ethernet services over 4 STM-1/STM-4 uplinks



OPCOM3500E-8EOS-FE aggregates up to 8 VC groups from 8 client site EoSDH converters



OPCOM3500E-4EOS-4FE provides flexible switching between customers' Fast Ethernet services and the VC groups in SDH transportation

OPCOM3500E-SHDSL-2W×8

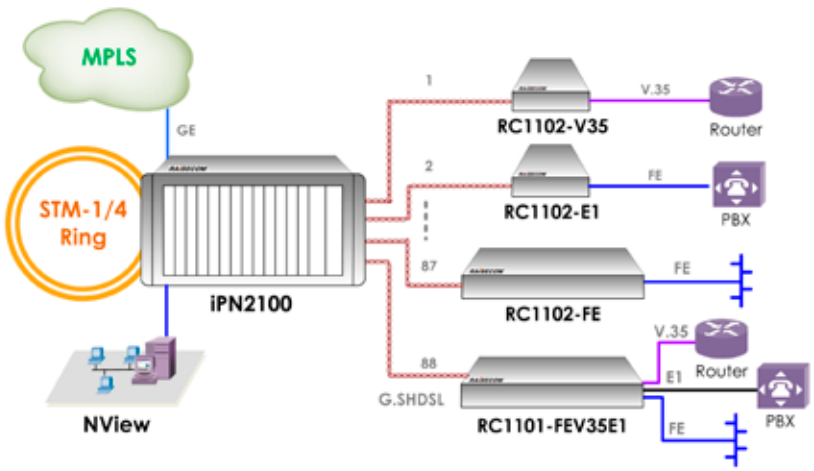
OPCOM3500E-SHDSL-2Wx8

G.SHDSL Card in MSAP

- Aggregates 8 G.SDHSL channels into STM-1/4 network
- Compliant to ITU-T G.991.2 standard
- Data rates from 192kbps up to 2.3Mbps over 2-wire copper
- Internal and External loopback function for link diagnostic
- Built-in BERT function

OPCOM3500E-SHDSL-2Wx8 is used to deliver E1, V.35 and Ethernet services on existing copper cables. It uses TC-PAM (Trellis Code – Pulse Amplitude Modulation) technology to transmit and aggregate remote services to STM-1/4. These services can be cross connected with VC12 granularity in the iPN2100 MSAP. By deploying them together with EoPDH cards, the aggregation of remote FE services to local FE or GbE can also be implemented.

By using Raisecom's NNM network management system, both local and remote management is implemented. All user configurable parameters can be set and monitored through the NNM system.



Extending and aggregating E1, V.35 and Fast Ethernet services to STM-1/4 over multiple 2-wire copper cables

OPCOM3101-155

OPCOM3101-155
OPCOM3101-155-BL

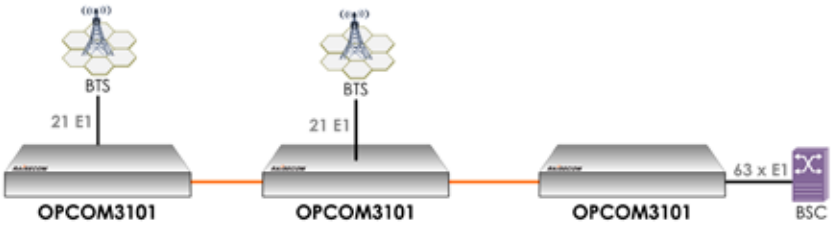
63E1 SDH ADM and TM

- 2 x STM-1 interfaces with independent or 1+1 path protection mode
- 63 x E1 interfaces with unbalanced/balanced mode
- 126 x 126 VC12 non-blocking cross connection
- 1+1 LPP with < 50ms switchover time
- Clocking compliant with G.813 standard
- Local/remote loopback on STM-1 and E1 interfaces
- Redundant AC/DC power supplies
- SNMP/Console/ECC embedded channel
- Local/remote software on-line upgrade

OPCOM3101-155 is a carrier-class SDH STM-1 multiplexer, which delivers up to 63 E1 circuits over an SDH network, fully compliant with all ITU-T SDH standards. It is offers great compatible with various types of network deployments such as point-to-point, chain and ring topologies. It also supports 1+1 low path protection, which guarantees reliable transportation.

It is mainly applied to access level transmission services in communication networks. It can be also used in other scenarios, such as when the communication network is established through E1 interfaces together with a GSM mobile cellular base station, ETS wireless access base station, switches and routers.

OPCOM3101-155 can be either managed via an in-band or out-of-band network management channel, or Raisecom's NView NNM network management system, which offers performance monitoring, alarm indication, configuration and maintenance options.



OPCOM3101 deployed as an Add & Drop Multiplexer (ADM) in a daisy chain

OPCOM3103-155-BL

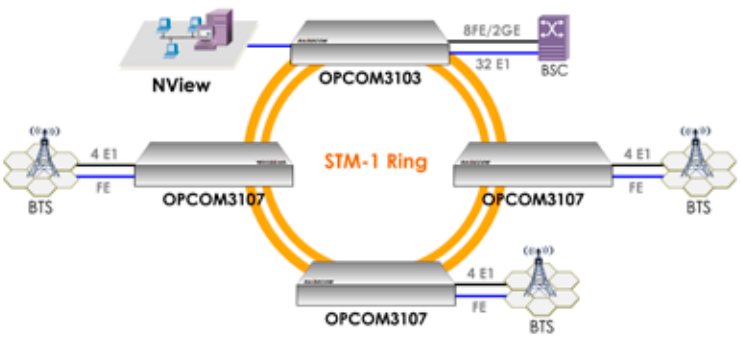
OPCOM3103-155-BL

Multi-Service SDH STM-1 ADM and TM

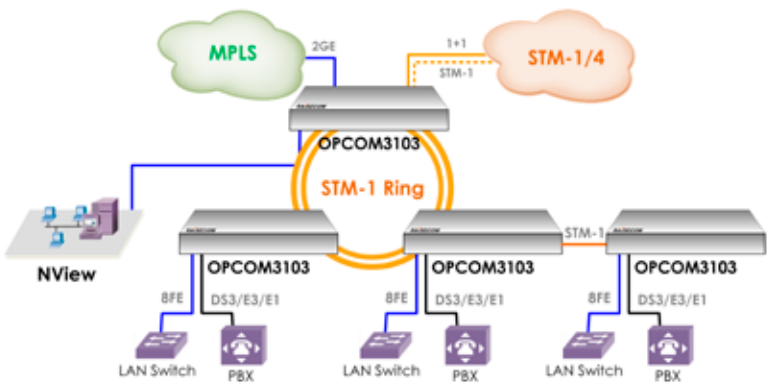
- 2 x SFP STM-1 interfaces with independent or 1+1 protection mode
- 32 x E1 interfaces with balanced 120 Ohm RJ45 connectors
- 6 x 10/100M Fast Ethernet electrical interfaces
- 2 x Fast Ethernet combo interfaces
- Expansion slot for additional interfaces:
  - 2 x STM-1 interfaces expansion card;
  - 2 x DS3/E3 interfaces expansion card;
  - 2 x GbE aggregation interfaces expansion card
- Support DDMI function on SFP interfaces
- Support GFP/LAPS encapsulation, VCAT and LCAS function
- 6 x 6 VC4 cross connection
- VC3/VC12 hybrid cross connection;
- 1+1 LPP with < 50ms switchover time
- Clock options include:
  - 2Mbit/2MHz external clock
  - STM-1 line clock
  - 1st-4th E1 line clock
  - Local oscillator
- Support SSM protocol
- Support retiming on 1st-4th E1 channels
- Support ALS and LPR detection
- Support Local/remote loopback
- SNMP/Console/in-band and out-of-band management
- Redundant AC/DC power supplies

OPCOM3103-155 is a standalone multi-service SDH multiplexer which provides a compact, cost-effective and versatile solution for transmitting E1 and Ethernet services. Its 8 Fast Ethernet interfaces share either 63 VC12 or 3 VC3. With the expansion slot, it can also provide an additional 2 STM-1, 2 DS3/E3 or 2 GbE interfaces. The redundant power supplies support AC, DC, and AC-DC hybrid.

As a next-generation STM-1 access device, the OPCOM310x also has EoSDH functionalities, such as standard GFP/LAPS encapsulation, virtual concatenation, and LCAS for dynamic bandwidth allocation.



STM-1 ring topology in carrier-class mobile backhaul application



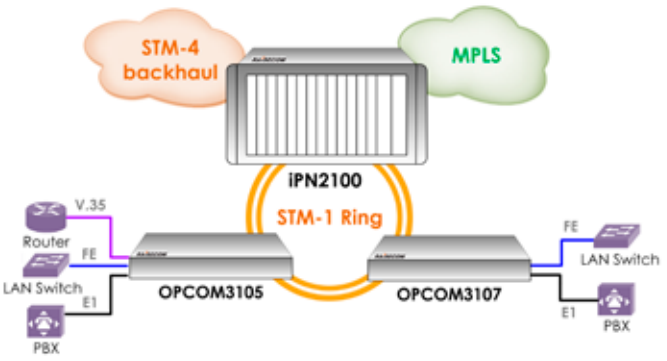
OPCOM3103 is deployed as an add & drop multiplexer (ADM) in a daisy chain

OPCOM3105-155
OPCOM3107-8E1(-BL)/16E1(-BL)

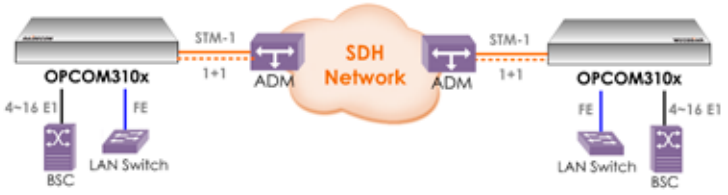
OPCOM3105-155
OPCOM3107-8/16E1(-BL)

Multi-Service SDH STM-1 ADM and TM

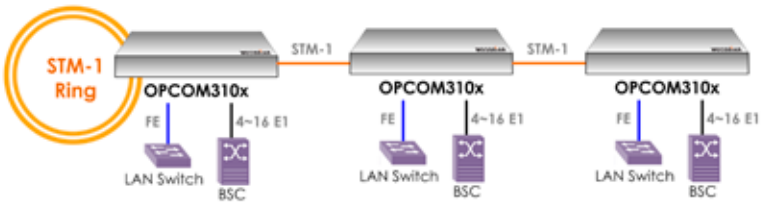
- 2 x STM-1 interfaces with independent and 1+1 protection mode
- 4/8/16 x E1 interface with unbalanced or balanced connectors
- 3 x FE interfaces (to 1st VCG) with L 2 switching functions
- 1 x FE interface (to 2nd VCG) independently
- Expansion slot for additional interfaces:
  - 2/4 x E1 interfaces expansion card;
  - 1/2 x V.35 interfaces expansion card;
  - 2 x 10/100M Fast Ethernet interfaces expansion card
- 189 x 189 VC12 cross connection
- Support both 1+1 MSP and 1+1 LPP
- Support GFP/LAPS encapsulation, VCAT and LCAS function
- Clocking compliant with ITU-T G.813 recommendation
- Support retiming on 1st-4th E1 channels
- Support ALS and Dying Gasp
- Local external loopback on optical interfaces
- Local external/internal loopback on E1 interfaces
- SNMP/Console/in-band and out-of-band network management



STM-1 ring topology in carrier-class transportation network



1+1 protected Terminal Multiplexer (TM) delivering E1 & Fast Ethernet services



Add & Drop Multiplexer (ADM) in a daisy chain

OPCOM3105 provides a fixed set of 4 E1 interfaces, 4 Fast Ethernet interfaces (over two VCGs), and 1 expansion E-SUBM slot with additional 2/4 E1, 1/2 V.35, or 1 Fast Ethernet over 1-4 E1 interfaces. OPCOM3107 has a fixed set of 8/16 balanced/unbalanced E1 interfaces, 4 Fast Ethernet over 2 VCGs, and dual redundant power supplies.

As a next-generation STM-1 access equipment, OPCOM310x also has EoSDH functionalities, such as standard GFP/LAPS encapsulation, virtual concatenation, and LCAS for dynamic bandwidth allocation.

Customers can either establish an in-band or out-of-band channel to configure or manage a single unit, or utilize Raisecom NView NNM network management system to conduct operations such as performance monitoring, alarm indication, configuration and management tasks.

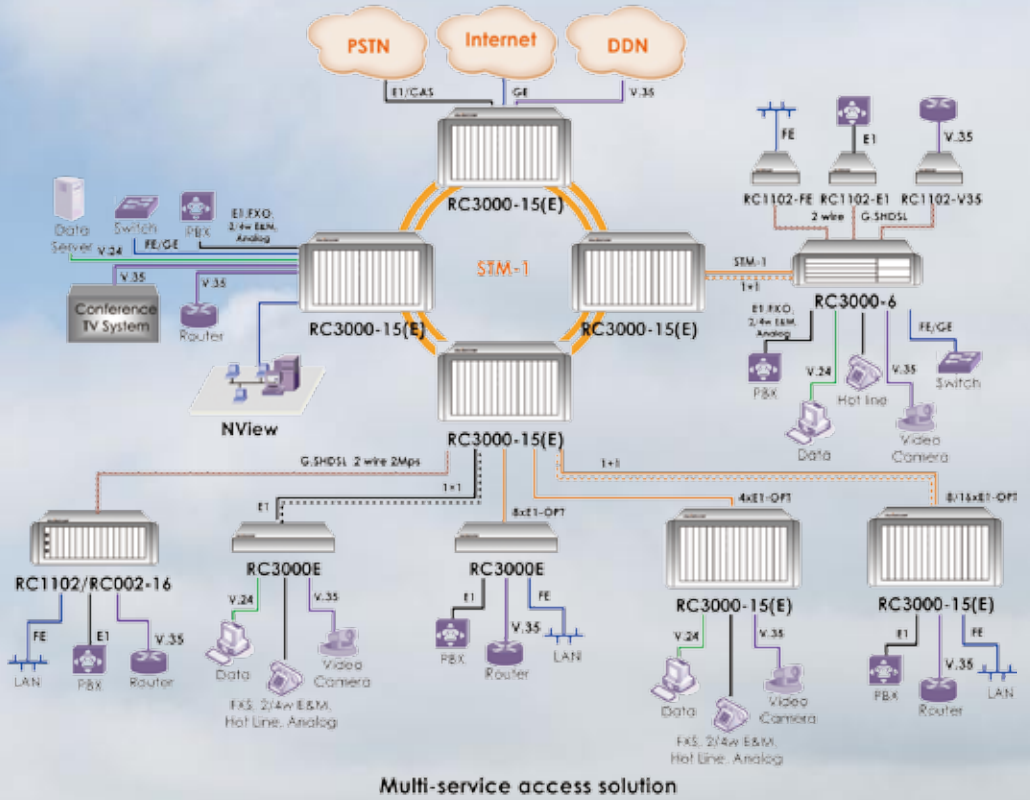
Chapter 9 - PCM

Raisecom's PCM Product Solutions are designed for Utilities, Carriers and ISP's. Utility subscribers usually have special requirements for Voice and Data Communications. For example, Subscriber/PBX analog interfaces, E&M line signaling interfaces, subscriber loop interfaces, charge telephone (polarity inversion) interfaces, magneto interfaces, hotline interfaces, carrier interfaces, 2/4 line VF interfaces, Ethernet, V.35 data, V.24 data and so on. Raisecom's PCM Product Solutions provides multiple Analog and Data interfaces.

The flexible modular design of the PCM system has provided for Utility subscribers maximum flexibility to meet their service requirements and goals, while allowing them to invest in and grow their markets keeping their TCO under control.

The PCM series Product Solutions can be deployed to the allow subscribers to gain easy access into PSTN public network, as well as Networks for Utilities (Water and Natural Gas), Electrical Power, Transportation, Oil and Gas, Government (both Military and Governmental Agencies), and DDN connections.

The PCM product family includes the Multi-Service Access Node RC3000-15 and RC3000-6, and the PCM Multiplexer RC3000E.



Multi-service access solution

RC3000-15

RC3000-6

RC3000-15-DXC

RC3000-15-8E1

RC3000-15-8E1-LH

RC3000-15
RC3000-6

Multi Service Access Node

- Integrated with digital/analog access, diplexer, DACS, transmission, protocol conversion functions and inverse multiplexing
- Access analog and digital circuits into STM-1 networks
- Electrical and optical E1 interfaces
- Support 128xE1 digital full access-connect
- Flexible network topologies: Point-to-Point, Linear Drop/Insert, Star and Mesh
- Conforms to Bellcore, IEEE and ITU standards
- Multipoint (multi-drop) voice and data interfaces
- Support High Speed Interfaces:
  STM-1 Optical Interface
  1/4/8/16 E1 Electrical and Optical Interfaces
  Gigabit Ethernet aggregate uplink Interface
- Support Voice Interfaces:
  FXS, FXO, FXS-FXS (Hot-line), 2/4wire E&M, Magneto Telephone
- Supported Data Interfaces:
  RS232 Asynchronous Data Interface 300 bps - 19.2Kbps
  V.24 Synchronous Data Interface 64Kbps - 128Kbps
  RS422 Asynchronous Data Interface
  RS485 Asynchronous Data Interface 300 bps - 19.2Kbps
  G.703 co-directional at 64Kbps Data Interface
  V.35 Synchronous Data Interface N×64 Kbps (N=1~31)
  10/100Base-T Ethernet Interface
  FE aggregation interface 64kbps - 16Mbps
  G.SHDSL Data Interface N×64kbps (N=1~31)
- Programmable A,B signaling bits (time slot 16; E1 systems) supports all voice switching equipment
- Supports power supply with alarm monitor
- DXC module support alarm input and output, external clock support 2Mbps and 2MHz
- E1 module support user configuration long haul transmission
- Support 1+1 protection for E1/STM-1/fiber interfaces and PSU/STM-1/DXC cards
- Hot swappable service cards
- Remote Configuration Control and Performance Monitoring
- SNMP management using Raisecom's NMS NView software.

Raisecom's RC3000-15 represents a new generation of intelligent Multi-Service Access Nodes and was designed for cost-effective Utility Network Access Applications. It provides a full range of voice and digital data services to subscribers located at different locations where voice and data connections are required over E1/STM-1 circuits.

The fully featured RC3000-15 Multi-Service Access Node provides for a powerful cross connection matrix and integrates all of the functionality required by a Utility. Digital/Analog, multiplexing, DACS, inverse multiplexing, and protocol conversion are just of few of the features. The 19-inch 6U-high RC3000-15 provides access for a variety of interfaces, including STM-1, 1/4/8/16 optical E1 on the Line Side, Electrical E1, FXO, FXS, E&M, analog voice trunk, hot-line, magneto telephone, RS232, V.24, RS422, RS485, G.703, V35, and Ethernet on the Drop Side. The RC3000-15 has capacity for 13 single slots and 2 PSU slots. These interfaces are compatible with other Raisecom's Solutions-Based products such as the OPCOM3500E (SDH), the RC3000-6 and the RC3000E.

The RC3000-6 is a low capacity version of Multi-Service Access Node. All of the interface cards of the RC3000-15 can be used in the RC3000-6. The 19-inch 3U-high RC3000-6 has capacity for 5 normal single slots, 1 small service slot for a switching card and 2 PSU slots. It also provides for a cost-effective solution of voice and digital data services for Utility customers. Raisecom's network management platform NView NMS may be deployed for real-time monitoring, alarm indication, management and maintenance (O, A, M, &P).

Item	RC3000-15	RC3000-6	RC3000E
Chassis (high)	6U	3U	1U
Number of Service-slots	13	6	4(1 uplink)
STM-1	4	2	—
GE uplink	2	1	—
Max. E1 channels	88	36	8
Cross-connect capacity	256Mbps	256Mbps	32Mbps
Max. FXO/FXS channels	352	128	30
Max. E&M channels	176	64	24
Max. V.35 channels	88	32	3
Max. V.24 channel	88	32	12
Max. RS232 channels	176	64	24
Max. FE channels	88	32	6
Max. G.SHDSL ports	88	32	—

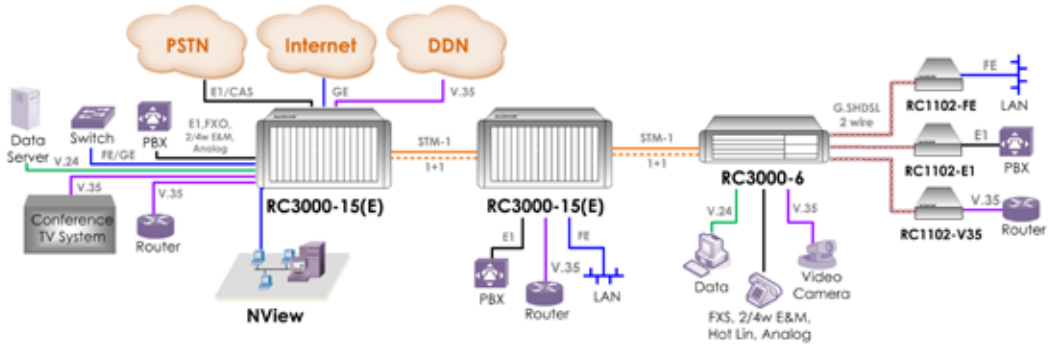
RC3000-15-STM1

RC3000-15-STM1

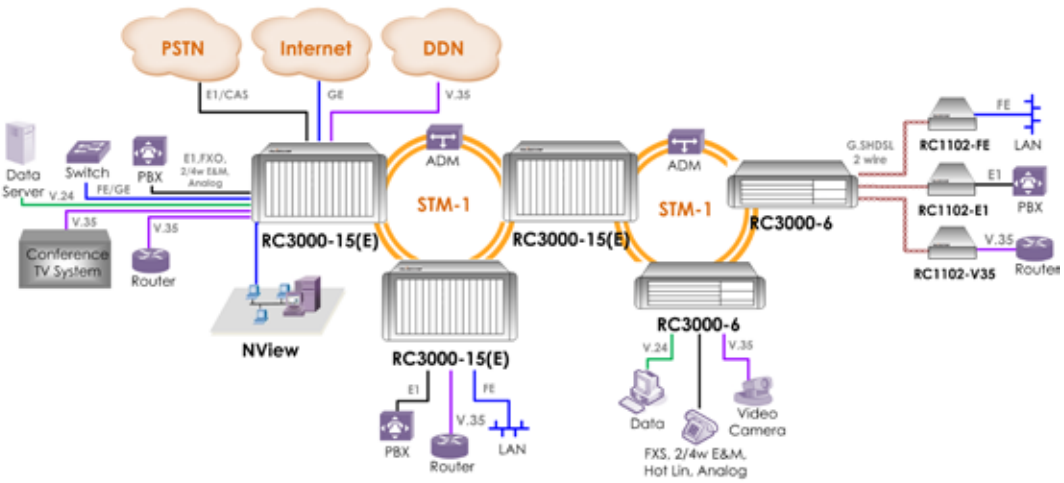
STM-1 Module in Multi-Service Access Node

- 2xSTM-1 aggregation unit provides 4xSTM-1 uplinks
- 1+1 protection for both STM-1 interfaces and STM-1 cards
- Non-blocking DACS of 252x252 VC12
- Delivers multiple E1s in each multiplexing fiber link
- Optional multi-mode, single mode or single strand fiber optics
- Available with 850, 1310, and 1550nm optical wavelengths
- Auto Laser Shutdown protection
- VCC channel for SNMP remote management
- Centralized SNMP network management via in-band or out-of-band channels

RC3000-15-STM1 card is an SDH STM-1 aggregation unit for RC3000-15 Multi Service Access Node. It provides 2 STM-1 optical interfaces which support STM-1 add/drop multiplexing as well as 1+1 interface protection over the SDH network. The 1+1 card protection can also be implemented when two such cards are used simultaneously. The RC3000-15-STM1 card can connect with remote OPCOM3100 series mini SDH multiplexers to implement point-to-point, Linear (D&I) and ring applications.



Daisy-chain application of the Multi -Service Access Node



STM-1 ring application of the Multi -Service Access Node

RC3000-15-120×2-OPT

RC3000-15-P240FE-OPT

RC3000-15-P480FE-OPT

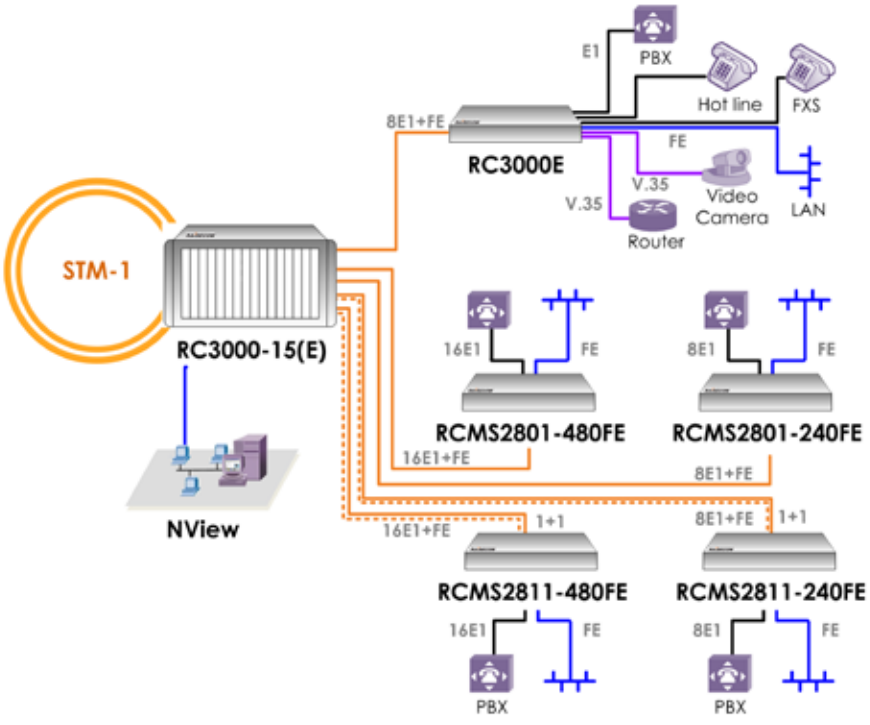
RC3000-15-120x2-OPT
RC3000-15-P240FE-OPT
RC3000-15-P480FE-OPT

FiberMux module in Multi-Service Access Node

- Deliver multiple E1s in each fiber link
- Cross Connect E1 circuits to backplane directly
- Auto Laser Shutdown for fiber port protection
- Local and remote alarm indicators on front panel
- Inside and outside loop-back command for each tributary
- Built-in BERT for diagnostics
- Manage remote RC83x, RC3000E and RCMS28xx FiberMux via fiber overhead

The RC3000-15 series FiberMux modules include 120x2-OPT, P240FE-OPT and P480FE-OPT devices. They are designed to provide from4xE1 to 16xE1 transmission over an optical fiber when used remotely with the RC83x, RC3000E, and RCMS28xx family FiberMux equipment. The P240FE-OPT and P480FE-OPT card supports an optional 1+1 interface protection and one 10/100Base-T Ethernet channel alongside the multiple E1 channels.

RC3000-15 FiberMux modules extend E1 network to customer premises when they work against the MSAP, enabling service providers and carriers to offer cost-effective access services to the customer premise.



FiberMux application of Multi-Service Access Node


RC3000-15-32FXO

RC3000-15-32FXS

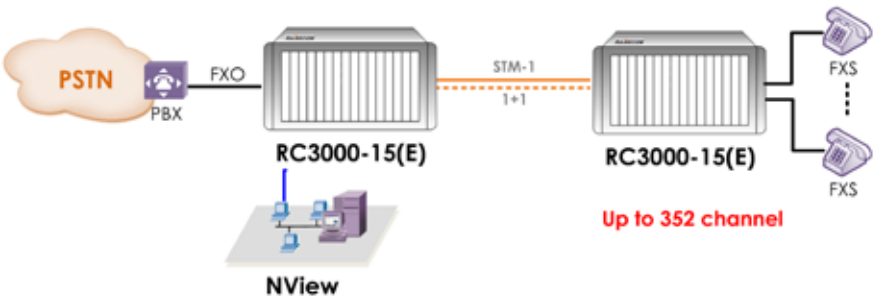
RC3000-15-32FXO
RC3000-15-32FXS

2-Wire Loop Signaling Voice Module in Multi-Service Access Node

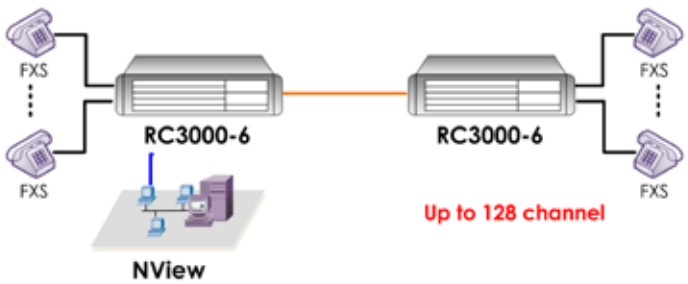
- Analog exchange to digital network interface (A-law PCM)
- 32 channels FXO/FXS interfaces per card
- Direct Inward Dialing (DID- Wink and Immediate Start) with polarity reversal for direct access to PBX extensions via the public network
- Private Line Automatic Ring down (PLAR) to link two telephones together for immediate connection as a "hotline"
- Programmable A,B signaling bits (time slot 16; E1 systems) supports all voice switching equipment
- Supports Caller ID Display Systems
- Supports both tone and pulse dialing
- Software adjustable attenuation of each Tx/Rx 2/4W-channel step at 0.1dB

RC3000-15 family of 2-wire loop signaling voice modules include RC3000-15-32FXO and RC3000-15-32FXS cards, which support most telephone exchanges (central offices and PBX's) and subscriber loop circuits.

Up to 32 independent channels are incorporated on each card. These FXO and FXS cards employ individual codec for each channels. The codec performs A/D and D/A conversion, A-law companding, filtering, and gain control. Both tone and pulse dialing are supported. The FXO and FXS cards support¬ caller ID display systems, polarity reversal and Ringdown (hotline) Services.



Loop signaling application of Multi-Service Access Node



Ringdown (Hotline) application of Multi-Service Access Node

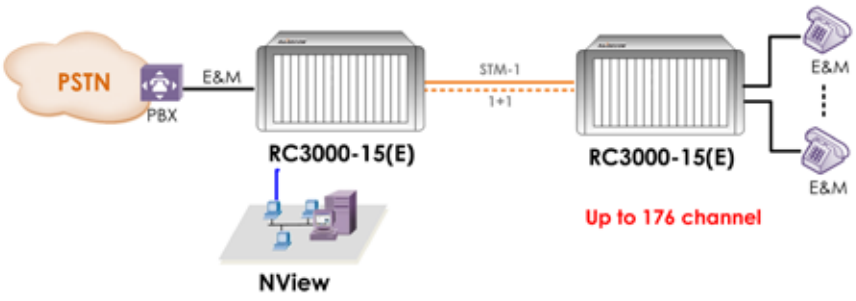
RC3000-15-16E&M

RC3000-15-16E&M

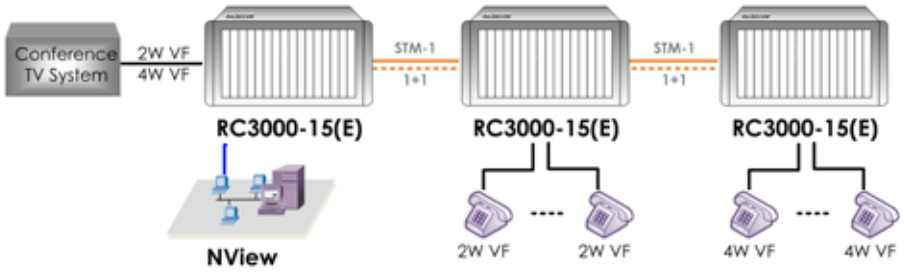
E&M Voice Module in Multi-Service Access Node

- Deliver multiple E1s in each fiber optic link
- Mapping E1 signal to backplane directly
- Auto Laser Shutdown and Dying Gasp
- Local and remote alarm indications on front panel
- Inside and outside loopback command for each tributary
- Remote RC83x and RCMS28xx series FiberMux are managed via fiber optic overhead channel

RC3000-15-16E&M card supports various applications such as 2/4 wire E&M trunks and PBX trunk lines. All configuration parameters are software configurable, including time slot assignment, 2/4-wire mode, adjustable attenuation, and loopback.



E&M trunk lines application of Multi-Service Access Node



Conference call application of Multi-Service Access Node

RC3000-15-16RS232

RC3000-15-8RS232H

RC3000-15-8V24

RC3000-15-8V24H

RC3000-15-8RS485

RC3000-15-16C64K

RC3000-15-16RS232 RC3000-15-8RS232H RC3000-15-8V24 RC3000-15-8V24H RC3000-15-8RS485 RC3000-15-16C64K

Low-Speed Data Module in Multi-Service Access Node

RC3000-15-16 RS232/ RC3000-15-8RS232H

- 8/16 channel RS232 asynchronous data interfaces per card
- 8RS232H card supports maximum asynchronous data rates of 57.6kbps
- Software configurable of loopback of each channel
- 16RS232 card supports multi-mode COM terminal server
- 8RS232H supports simultaneous transmission for handshake and data signals

RC3000-15-8V24/ RC3000-15-8V24H

- 8 channels V.24 synchronous data interfaces per card
- Maximum data speed is 128kbps
- Software configurable loopback of each channel
- 8V24H supports simultaneous transmission for handshake and data signals

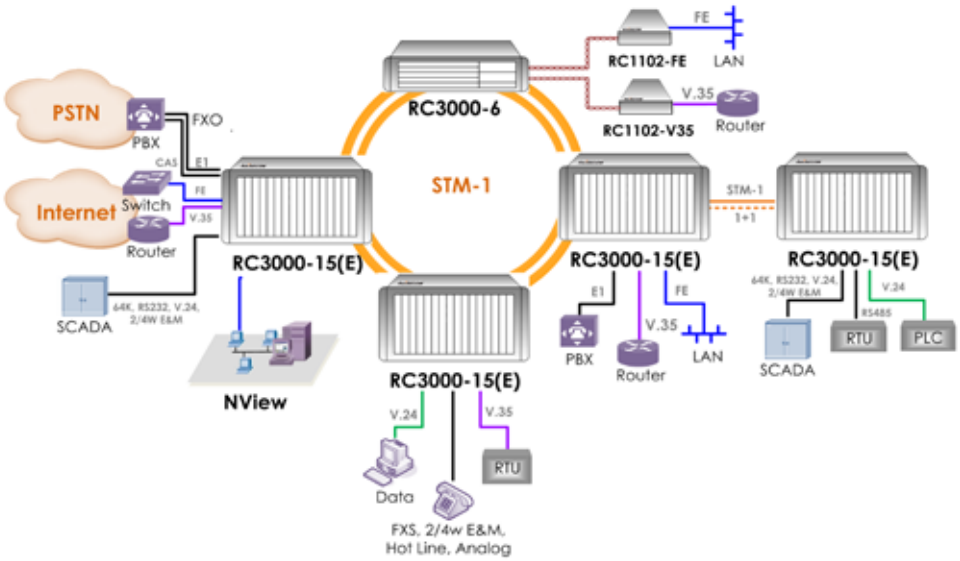
RC3000-15-8RS485

- 8 channels RS485 asynchronous data interfaces per card
- Maximum serial speed is 460.8Kbps
- Full-duplex (RS422) or half-duplex (RS485) communication modes
- Software configurable loopback of each channel

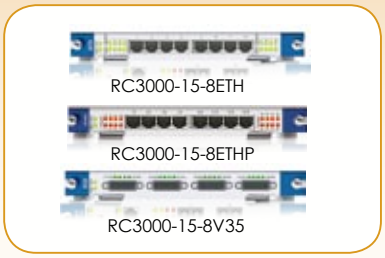
RC3000-15-16C64K

- 16 channels co-directional 64K data interfaces per card
- Built-in BERT for diagnostics

Low-speed data interfaces are available including RS232, RS485, V.24, V.35 and Co-Directional in RC3000-15 system. Terminals, personal computers, and other low-speed devices can be accessed together over E1 and STM-1 circuits using the RC3000-15 Multi-Service Access Node. As a multi-mode COM terminal server, RC3000-15-16RS232 is capable of providing flexibility and economical usage of the network server. All configuration parameters are software configurable including time slot assignments, terminal server mode applications, and loopback operation. These cards conform to relevant sections of ITU-T V.24 and RS232 recommendations for data communications and data circuit termination.



SCADA application of Multi Service Access Node



RC3000-15-8ETH
RC3000-15-8ETHP
RC3000-15-8V35

High-Speed Data Module in Multi Service Access Node

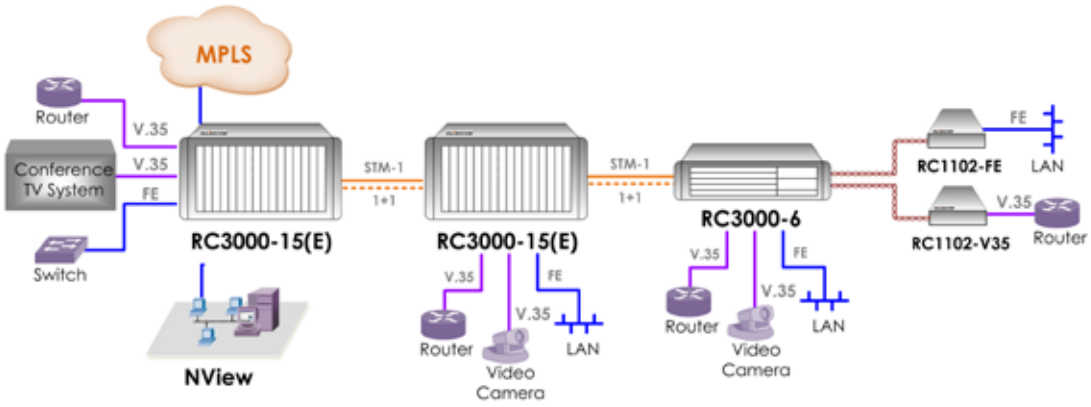
RC3000-15-8ETH

- Maximum data rate at Nx64Kbps (N=1~32)
- 8 channels 10/100BaseTx interfaces per card
- Ethernet 10/100M auto-negotiation, MTU up to 1536 Bytes
- IEEE802.3, 802.3x flow control, auto-MDI/MDIX
- RC3000-15-8ETH Has Three working modes: straight-through, port aggregation, and backplane (switch card) aggregation
- 8 channels 10/100BaseTx interfaces are isolated mutually in RC3000-15-8ETHP
- Supports loopback detection of transmission line
- Hot swappable design
- Supports RC952 and other devices as a remote device
- Provides the function of port status display

RC3000-15-8V35

- Maximum data rate of Nx64Kbps (N=1~31)
- 8 channels V.35 synchronous data interfaces per card
- Built-in BERT for diagnostic
- Software configurable loopback of each channel
- Port Status display functionality

RC3000-15-8ETH and RC3000-15-8V35 cards support customers' needs for high speed data transmission services. Applications such as mainframe to mainframe computer communications, data file transfer, and LAN data streams are supported. As an Ethernet Switch, RC3000-15-8ETH is capable of providing flexibility and cost-efficiency for LAN applications. All configuration parameters are software configurable including time slot assignments, terminal server mode applications, and loopback operations.



High-speed data application of Multi-Service Access Node

RC3000-15-FE16E1

RC3000-15-HT-8FE16E1

RC3000-15-FE16E1
RC3000-15-HT-8FE16E1

Inverse Multiplexer Module in Multi-Service Access Node

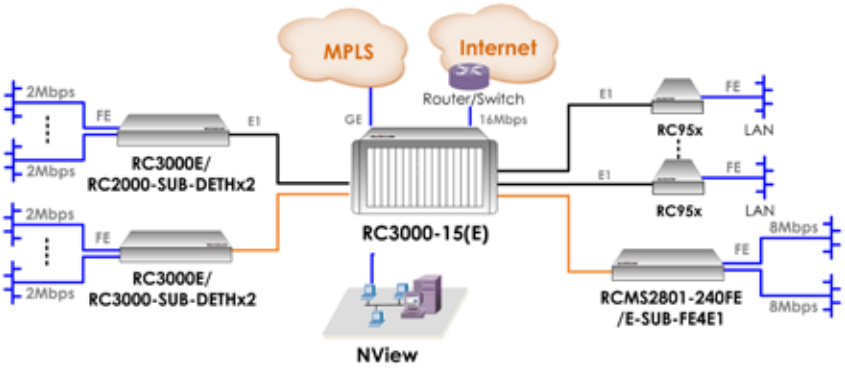
RC3000-15-FE16E1

- Maximum speed of the Ethernet interface is 16Mbps
- Supports inverse multiplexing function and loopback testing
- IEEE802.3, 802.1q VLAN tagging and stacking
- Bandwidth self-adjustment with LCAS-LINK
- Supports E1 alarm, CRC, loopback, and built-in BERT

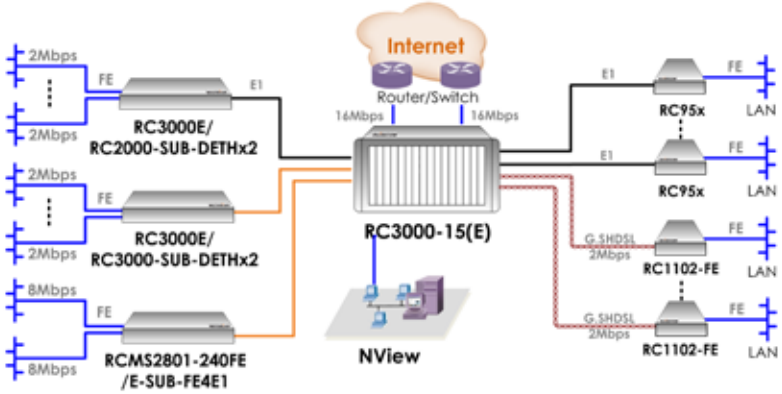
RC3000-15-HT-8FE16E1

- Supports 8 Ethernet interfaces, Maximum speed is 16Mbps
- Supports inverse multiplexing function and loopback testing
- Each Ethernet interface can be configured independently.
- Bandwidth self-adjustment with LCAS-LINK
- Support E1 alarm, CRC, loopback and built-in BERT

RC3000-15-FE16E1 and RC3000-15-HT-8FE16E1 cards support Fast Ethernet interfaces with inverse multiplexing functionality. Each FE interface can be mapped up to a maximum of 8 E1 circuits. These cards provide a larger bandwidth pipe than traditional PCM Ethernet solutions in order to meet the customers' requirements for bandwidth demanding applications. LCAS LINK enables those cards to adjust the transmission bandwidth dynamically according to available E1 circuits. E1 alarm indication, loopback test operation, and built-in BERT functions make it easy to test and deploy this equipment.



FE16E1 inverse multiplexer application of Multi-Service Access Node



8FE16E1 inverse multiplexer application of Multi-Service Access Node

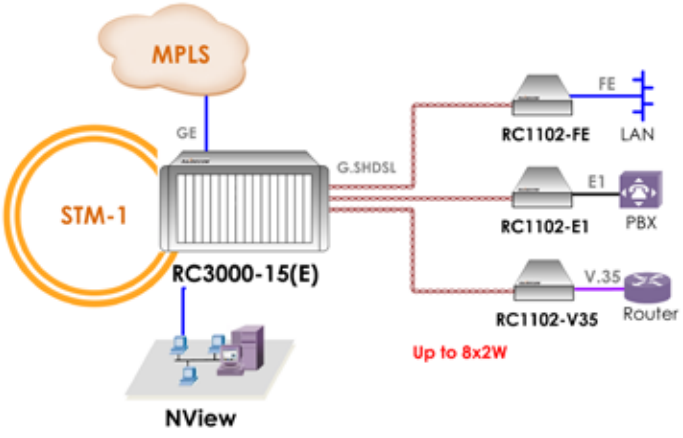
RC3000-15-SHDSL-2Wx8

RC3000-15-SHDSL-2W×8

G.SHDSL Module in Multi Service Access Node

- 8 channel G.SHDSL interfaces per card
- Data rates from 192kbps up to 2.3Mbps over each 2-wire twisted pair
- Meets the ITU-T G.991.2 standard
- Software control of loopback operation of each channel
- Built-in BERT for diagnostic
- Hot swappable design
- Provides port status display functionality

RC3000-15-SHDSL-2Wx8 card enables telecommunication service providers and private network operators to obtain maximum performance from existing twisted pair copper wires. It uses TC-PAM (Trellis Code – Pulse Amplitude Modulation) technology to transmit and aggregate remote services including E1, V.35, and Fast Ethernet services from 2 to 16-wire copper pairs. All configuration parameters are software configurable including time slot assignments, frame mode, and loopback operation.



G.SHDSL application of Multi-Service Access Node

RC3000E

RC3000E

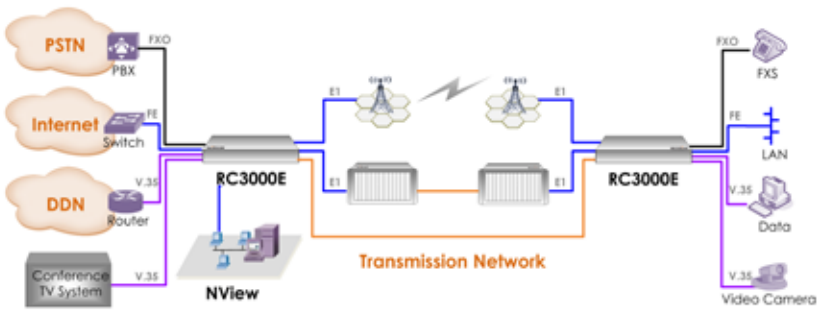
Multi-Service Access Node

- Flexible network topologies: Point-to-Point, Linear Drop/Insert, Star and Mesh
- Electrical and optical E1 interfaces, electrical E1 port support 1+1 protection
- Main board supports full signaling cross connection of 512x512 by timeslots
- Multipoint (multi-drop) voice and data interfaces
- Up to 32 channels of voice interfaces
- Support high speed interfaces:
  4/8 E1 Electrical and optical Interfaces
- Support Voice interfaces:
  FXS, FXO, FXS-FXS (hot-line), 2/4-wire E&M
- Support data interfaces:
  RS232 asynchronous data interface
  V.24 synchronous data interface 64Kbps - 128Kbps
  RS422 asynchronous data interface
  RS485 asynchronous data interface
  G.703 co-directional 64Kbps data interface
  V.35 synchronous data interface Nx64kbps (N=1~31)
  10/100BaseT Ethernet interface
- Hot swappable design
- Built-in BERT for diagnostic
- Remote configuration control and performance monitoring
- Support SNMP and console interface, device online upgrade
- Software configurable alarm output function

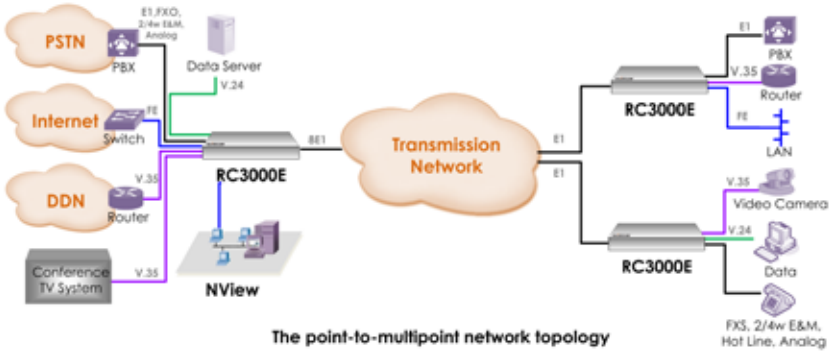
RC3000E is a multi-service multiplexing device which makes full use of the 2M circuit resource of carriers to provide subscribers with Ethernet, V.35, low-speed data, and various voice interfaces. It accomplishes voice and data multi-service cross connections and multiplexing functions over one line.

Meanwhile, it also provides FiberMux interface cards and E1 interface cards to satisfy various access environment and aggregation requirements.

RC3000E integrates the functions of digital and analog access, multiplexing, cross connecting, transmitting and protocol conversion. It provides cost-efficiency by making full use of the existing transmission circuit resources, efficiently supporting current available services for the customer and providing for the possibility of expanding in the future. Based on the existing SDH or MSTP network, RC3000E provides subscribers a better access solution with a better price ratio while providing high performance, driving down the TCO.



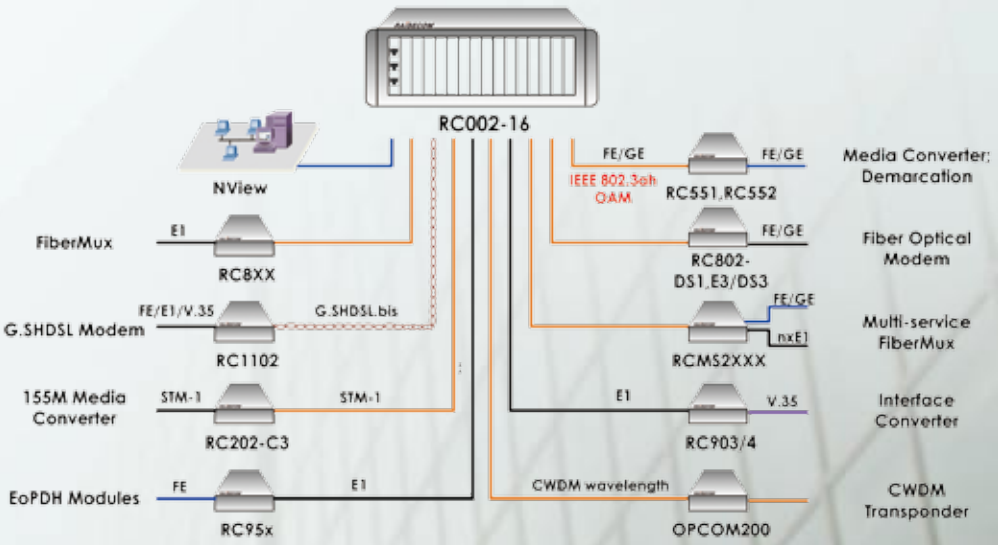
The point-to-point network topology



The point-to-multipoint network topology

Chapter 10 - Multi-service Modem Pool &Chassis

Raisecom's versatile product line of multi-service modem pool and chassis includes chassis of different size, with different number of slots, and with or without network management agent. Hot-swapping of service cards and SNMP agent card are supported by all Raisecom chassis and the replacement will not affect service communication. In addition, Raisecom provides customers with the flexibility of choosing the type of power supply connector according to actual need. All Raisecom chassis are with CE and UL marks



Multi-service Modem Pool

RC002-16 offers carriers a winning deployment strategy and supports a combination of Raisecom modular devices, including E1/V.35 fiber modem, G.SHDSL modem, E1 to V.35 interface converter, Ethernet media converter, STM-1 copper to fiber media converter, fiber optical modem, multi-service fiber mux, video optical multiplexer, and etc., to deliver different types of services in point-to-point applications. SNMP management over the central office and remote site is supported and each remote CPE can be configured and monitored from the central office. All cards can be placed in a 1-slot chassis and deployed at the remote site to help customers save inventory cost. In addition, the plug-and-play design makes deployment easier, and consequently saves customer's training cost. Raisecom also provides flexible power supply choices for the 1-slot chassis that will be deployed at the remote site. Customers can ignore the power supply difference at different customer premises.


RC002-16

RC002-16
16-Slot Chassis

- Rack-mountable 3U height chassis for the housing and network management of at most 15 Raisecom service cards, regardless of service types
- 16 slots for plug-in cards including the SNMP agent card RC002-NMS1 or RC001-NMS2
- Power supply system with flexible choice and redundancy
- 4-chassis cascade enables the management over more than 60 pairs of service cards through one IP address
- Acceptable card types:
  - RC002-NMS1 master SNMP agent card and RC001-NMS2 slave SNMP agent card
  - RC1~6 series media converter
  - RC8xx series Fiber Optical modem/Multi-Service FiberMux (1/2/4/8 E1 channels, 1 T1 channel or 1 DS3/E3 channel)
  - RCMS series Multi-Service FiberMux (1/2/4/8 E1 channels + FE/GE,4/8 T1 + GE)
  - RC9xx series interface converter (Ethernet to E1, Ethernet to DS3/E3, Ethernet to V.35 and E1 to V.35)
  - RC1102 series G.SHDSL modem
  - OPCOM200 series CWDM card


RC001-1

RC001-1
Single Slot Chassis without Management

- Rack-mountable and wall-mountable chassis, less than 1U height
- 1 slot for Raisecom modular service card, regardless of card type
- Flexible power supply choice, AC/DC/WP power supply socket
- Acceptable card types:
  - RC1~6 series Media converter
  - RC8xx series Fiber Optical modem/Multi-Service FiberMux (1/2/4/8 E1 channels, 1 T1 channel or 1 DS3/E3 channel) , excluding those take up 2 slots in RC002-16
  - RCMS series Multi-Service FiberMux (1/2/4/8 E1 channels + FE/GE, 4/8 T1 + GE) , excluding those take up 2 slots in RC002-16
  - RC9xx series interface converter (Ethernet to E1, Ethernet to DS3/E3, Ethernet to V.35 and E1 to V.35) , excluding those take up 2 slots in RC002-16
  - RC1102 series G.SHDSL modem
  - OPCOM200 series CWDM card


RC001-1D

RC001-1D
Dual-Width Single Slot Chassis

- Rack-mountable and wall-mountable chassis, less than 2U height
- 1 slot for Raisecom modular service cards that take up 2 slots in RC002-16
- Flexible power supply choice, AC/DC/WP power supply socket
- Acceptable card types:
  - RC952-2FE2E1, RC952-SE1M, RC954-FE4E1, RC954-FX4E1, RC954-2FE4E1-BL, RC954-2FE8E1-BL,RC832-120L, RC832-240L, RC832-240L-BL
  - RCMS2802-120LFE(-BL), RCMS2802-240LFE(-BL), RCMS2802-120LGE(-BL), RCMS2802-240LGE(-BL), RCMS2802-4(8)T1FE, RCMS2912-4(8)E1T1GE-BL

RC001-2D

RC001-2D

2-Slot Chassis without Management

- Rack-mountable and wall-mountable chassis, less than 2U height
- 2 slots for Raisecom modular service cards that take up 2 slots in RC002-16
- Flexible power supply choice, redundant AC/DC/WP power supply sockets
- Acceptable card types:
  - RC952-2FE2E1, RC952-SE1M, RC954-FE4E1, RC954-FX4E1, RC954-2FE4E1-BL, RC954-2FE8E1-BL, RC832-120L, RC832-240L, RC832-240L-BL
  - RCMS2802-120LFE(-BL), RCMS2802-240LFE(-BL), RCMS2802-120LGE(-BL), RCMS2802-240LGE(-BL), RCMS2802-4(8)T1FE, RCMS2912-4(8)E1T1GE-BL

RC001-1M

RC001-2M

RC001-1M/2M

1/2-Slot Chassis with Management

- Rack-mountable and wall-mountable 1U height chassis with in-build SNMP agent
- 1/2-slot for Raisecom modular service cards, regardless of card type
- Single slot chassis with redundant AC and DC power supply
- 2-slot chassis with Flexible power supply choice, AC/DC/WP power supply socket, redundant AC and DC power supply is also available
- Acceptable card types :
  - RC1~6 series Media converter
  - RC8xx series Fiber Optical modem/Multi-Service FiberMux (1/2/4/8 E1 channels, 1 T1 channel or 1 DS3/E3 channel) , excluding those take up 2 slots in RC002-16
  - RCMS series Multi-Service FiberMux (1/2/4/8 E1 channels + FE/GE, 4/8 T1 + GE) , excluding those take up 2 slots in RC002-16
  - RC9 series interface converter (Ethernet to E1, Ethernet to DS3/E3, Ethernet to V.35 and E1 to V.35) , excluding those take up 2 slots in RC002-16
  - RC1102 series G.SHDSL modem
  - OPCOM200 series CWDM card

RC202-C3

RC202-C3

- 155M (STM-1/OC-3) physical layer copper to fiber media converter
- High reliability, comply with ITU-T G.703 and G.957
- Single-mode or multimode fiber, single fiber available, distance up to 120 km
- Support local and remote loop-back on electrical or optical interface for system diagnostic.
- Suitable for SDH and ATM 155.52 Mbps interface interconnection.
- Simple operation and maintenance
- Hot-swappable
- Compact design and low power consumption.
- Modular version installed in 1, 4, or 16-slot chassis with AC/DC power
- SNMP management via RC001-1M, RC002-4, and RC002-16

RC903/RC904

RC903/RC904

Interface converter

- Conforms ITU-T V.35, G.703 standards
- RC904-V35FE1-BL provides a 120 Ohm balanced E1 interface ; RC903-V35FE1 provides both E1 interface options: 75 Ohm unbalance and 120 Ohm balance.
- Both PCM30 and PCM31 are available in fractional mode, and CRC4 function is auto-sensing.
- V.35 interface can connected with other DCE equipment
- Active clocks can support inter-clock, E1 external-clock, and V.35 line clock.
- When working in pairs in the fractional mode, the time-slot configuration of the local site can automatically follow the remote site.
- Provide 2 loop functions: E1 local loop, V.35 local loop.
- Internal bit error test unit can analysis and test the line with various loop-bake modes.
- Provide phase adjustment function for the V35 receiving data.
- SNMP management via RC001-1M, RC002-4 and RC002-16 chassis

RC904-V35FE1

RC802-E3/RC802-DS3

RC802-E3/RC802-DS3/RC802-DS1

Fiber Optical Modem

- Auto-Laser-Shutdown and Dying Gasp (remote power off indication) available
- Optional B8ZS and AMI codes
- Aggregate data rate: E3: 34.368 Mbps, DS3: 44.736 Mbps
- Transparent to Framing Formats.
- Single-mode or multimode fiber, single fiber available, distance up to 120 km
- Local and remote fiber optic line loopback,Local E3/DS1 port loopback
- inbuilt BER tester corresponding to indicators
- DS1 electrical port has 9 levels for short haul or long haul transmission
- SNMP management via RC001-1M, RC002-4, and RC002-16 chassis

RC802-DS1

RC832-120L-BL

RC832 series

Fiber Optical Modem/Multi-Service FiberMux

- 1/2/4/8 E1 channels over fiber in point to point application
- The part number without –BL has 75ohm unbalanced E1 ports, including –BL means it has 120ohm balanced E1 ports
- The part number including –FV35 support three types clock timing mode: internal, fiber line in, V.35 terminal, and a build-in Bit Error Tester inside
- Optional multimode, single mode or single strand fiber optic cables
- Auto-Laser-Shutdown and Dying gasp functionality
- The local and remote alarms can be displayed simultaneously
- Local and remote loop-back configuration
- Aggregation by MSAP OPCOM3500E available
- SNMP local and remote management

RC832-120L/240L

RCMS2802-120LGE-BL

RCMS2802-240LGE-BL

RCMS2802 Series

Multi-Service FiberMux

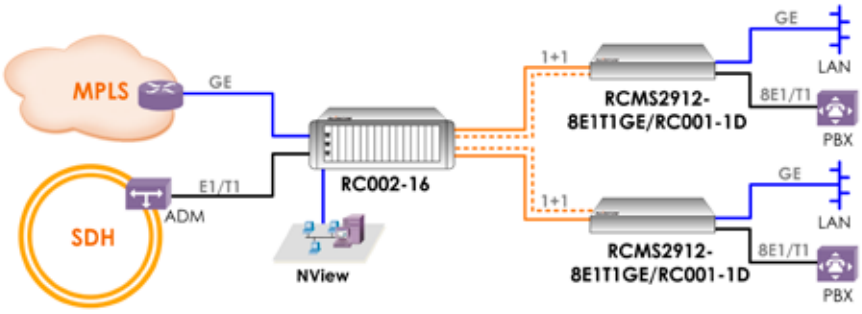
- Cost-effective wire-speed Fast-Ethernet or Gigabit-Ethernet and maximum 1/2/4/8 E1 to fiber simultaneously, the E1 and Ethernet traffics are isolated by TDM technology
- Pure 100Mbps or 1000Mbps wire-speed bandwidth for fixed Gigabit Ethernet
- Transparent E1 transmission for fractional E1 data or unframe E1 data
- Optional multimode, single mode or single strand fiber optic cables
- Alarm indications in front panel
- Auto-Laser-Shutdown and Dying Gasp functionality
- Local and remote loop-back configuration
- Could be aggregated by MSAP OPCOM3500E available
- Also featured by modularization design with high security, stability, reliability, and easy to use. Power supply is provided from the chassis backplane.
- SNMP local and remote management

RCMS2912-4(8)E1T1GE-(BL)

RCMS2912-4(8)E1T1GE-BL

4(8) E1/T1 + GE Multi-Service FiberMux

- Cost-effective wire-speed Gigabit-Ethernet and 4/8 E1/T1 to 1+1 redundant SFP fiber links simultaneously, the E1/T1 and Ethernet traffics are isolated by TDM technology
- Pure 1000Mbps wire-speed bandwidth for 100/1000Mbps Auto-negotiation Ethernet interface
- Transparent E1 or T1 transmission optional via DIP switch
- Auto Laser Shutdown protection and Dying Gasp functionality
- Alarm indications in front panel.
- Local and remote loop-back configuration,and a build-in Bit Error Tester inside
- Support IEEE802.3x and back pressure flow control
- Also featured by modularization design with high security, stability, reliability, and easy to use. Power supply is provided from the chassis backplane.
- SNMP local and remote management



RCMS2912 series connected in pairs to extend 8 x E1/T1 and GE over 1+1 redundant fiber links

Chapter 11 - Network Management System

The aim of building up a network management system is ultimately to maximize network efficiency and minimize network downtime at a system level. The five-layer structure recommended by ITU-T Telecommunication Management Network (TMN) is by far the most prevailing model adopted when developing a network management system for telecommunication network. The five layers defined in the structure play roles at different levels, yet work interactively through effective interfacing to build a comprehensive system.

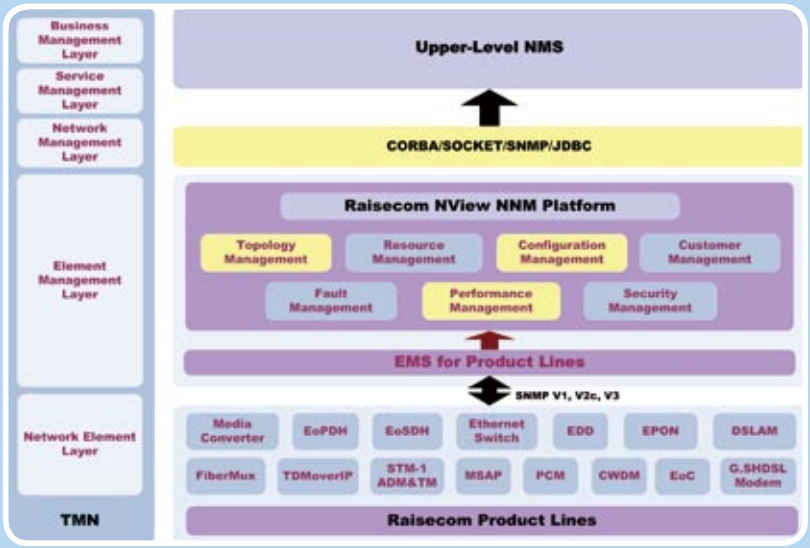
A network management system should also conform to the FCAPS model, which defines the functions a network management system is supposed to implement. FCAPS is an acronym for Fault, Configuration, Accounting, Performance, and Security, which are the management function categories into which the TMN model defines network management tasks.

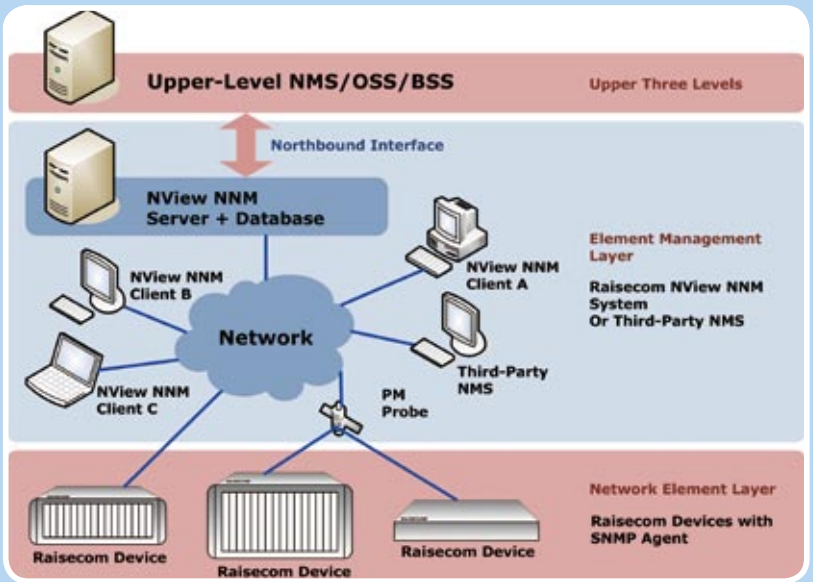
As a telecommunication equipment vendor focuses on access network, Raisecom applies herself to develop a network management system to manage over not only all Raisecom devices but also the networks built up by Raisecom devices and devices from other vendors. Basically, Raisecom network management system, NView NNM, covers the lower two layers in the TMN architecture and implements fault management, configuration management, performance management, and security management in the FCAPS model. A northbound interface is available on the system for the integration to network management systems implementing full FCAPS functions on the higher three levels of TMN architecture.

Raisecom's NView NNM system is a C/S structured system, in which several Clients can work opposite one Server. This provides carriers great convenience when monitoring and managing devices.

All Raisecom network manageable devices have either an internal or an external SNMP agent for communicating with EMS (Element Management System), and a uniform platform is designed for managing all devices in the network on one topology.

Third-party NMS can directly manage over Raisecom network manageable devices by using Raisecom MIBs. Upper-level NMS/OSS/BSS can share the data and results on NView NNM system through the northbound interface.





NView NNM

NView NNM Platform & EMS

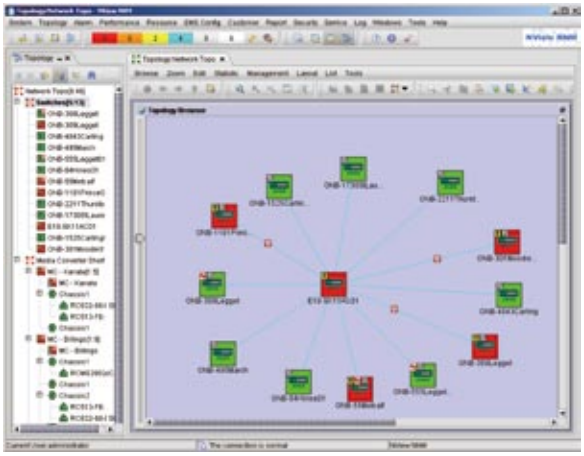
Network Management System

Raisecom NView NNM system aims at telecommunication access network and emphasizes on the centralized configuration and fault monitoring of all-series Raisecom network manageable devices. NView NNM provides a uniform network management platform for all devices under management, all Raisecom element management systems have been integrated in. The platform already provides function components of topology management, resource management, fault management, configuration management, customer management, and security management at its first installation. A performance management component can be selected to be installed on the platform according to customer's factual need. A license will be required when install NView NNM system to verify the legacy of using the platform and each components.

Features of Major Function Components

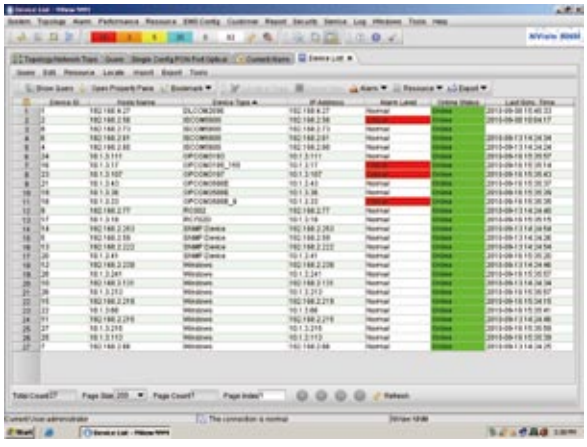
Topology Management

- Multi-level topology displaying
- Manual or automatic topology arrangement
- Device node auto-discovery mechanism
- Device sub-graph auto-drawing mechanism
- Clear indication of current alarm status and device offline status
- Quick location of point of failure in the network
- Topology style customization



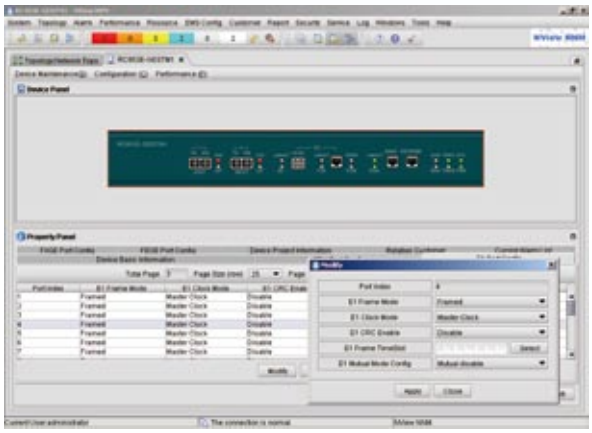
Resource Management

- Unified management tool for different resources, like devices, chassis, cards, and ports
- Comprehensive resource description, including customer and fault information
- Uniform query platform for quick search of resources
- Synchronization mechanism that guarantees the system showing real-time status of network resources
- Uniform platform for online devices polling and offline device detecting
- Resource type and idle slot statistics report per subnets



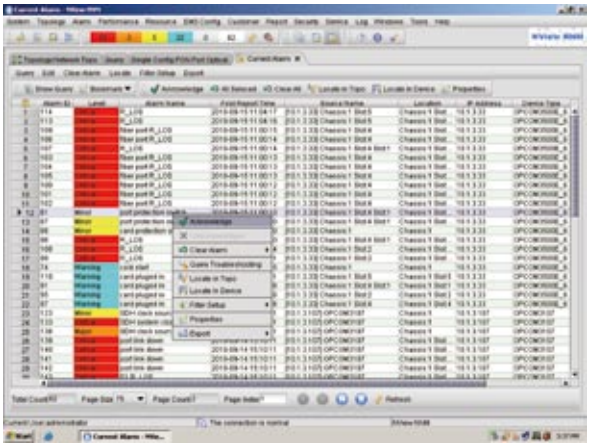
Configuration Management

- Uniform platform for different EMS, different devices sharing topology, resource, fault, performance, security functions
- User-friendly device status displaying on device panels drawn by EMS
- Real-time status changing feedback for every device configuration
- Data center provided for centralized management of firmware upgrade and configuration files upload/download
- Batch configuration of SNMP parameters



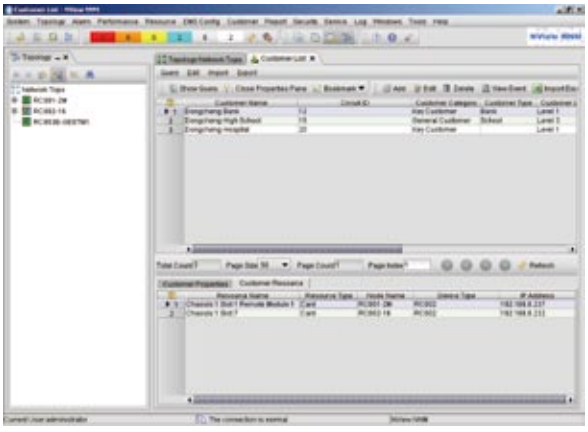
Fault Management

- Standard five-level alarm displaying
- Separate lists for current and historical alarm management
- Grouped alarm monitoring interface defined according to customer's need
- Customized alarm filter rules that filter the displaying of events with less importance
- Automatic alarm lists clearing service
- Alarm forward service that forwards alarms received on NView NNM to third-party platform via SNMP
- Alarm locating and troubleshooting library makes fault removal quicker and easier



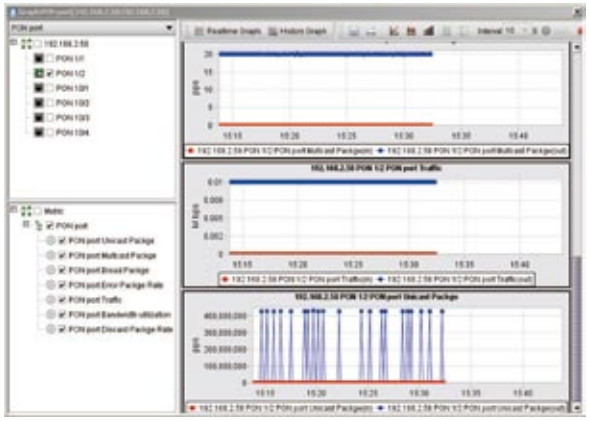
Customer Management

- Centralized customer information management
- Customer-based resource management
- Customer-based fault management
- Customer information import and export



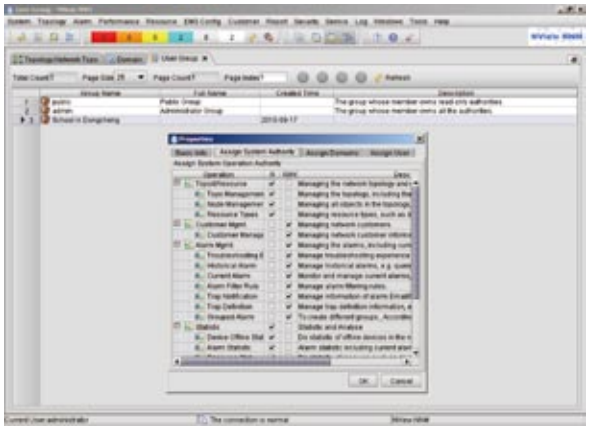
Performance Management

- Uniform performance management system for all devices under management
- Tailored deployment for network of different capacity
- Monitor device CPU and RAM utilization
- Collect PON/Ethernet/UNI/SDH port current and historical performance data
- Performance graph drawn on the basis of performance data collected
- Performance data export



Security Management

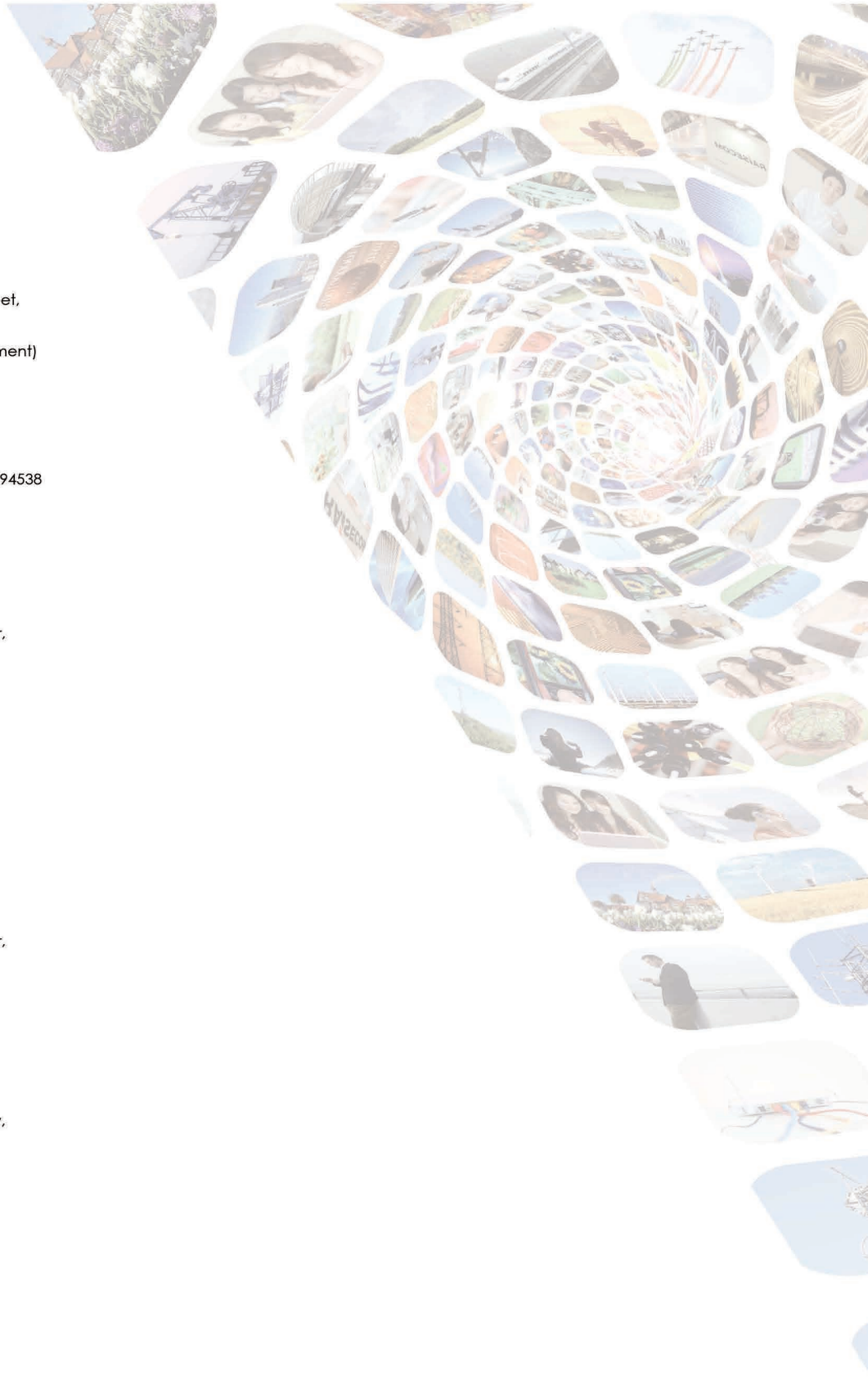
- Multi-domain multi-authority management
- Different user profiles have different read and/or write authorities over devices in different subnets
- Client access control mechanism
- Unauthorized login deny mechanism
- Keeps system and device operation logs and supports log export



Raisecom Network Management System Portfolio

NView NNM Platform, Components and EMS for different product lines

		Element Management System	
NView NNM Platform	Performance Management Component (Optional)	EoPDH Aggregation Gateway	RC953E series RC959 series
		EoSDH	RC702 series
		SDH A&D Multiplexer	OPCOM3100 series
		MSAP	OPCOM3500E
		PCM	RC3000-15 RC3000E
		TDMoverIP	RC1201 series
		Chassis with SNMP Agent	RC001/2 series RC006 series Managing over modular mEdia converters, interface converters, G.SHDSL modems, PDH multiplexers, CWDM dEvice, and other last mile access devices
		CWDM	OPCOM100 series
		EPON	ISCOM5xxx/6xxx series
		DSLAM	DLCOM2096
		EoC	ISCOM4002
		Ethernet Switches	ISCOM2xxx series
		Ethernet Demarcaion	RC551E series
		Packet Transportation	iPN series oPN series



Raisecom Headquarter
Address: No. 2 Building, 28 Shangdi 6th Street,
Haidian District, Beijing. 100085
Tel: +86-10-82883305 (International Department)
Fax: +86-10-82883056
Sales Department: export@raisecom.com

Raisecom USA Headquarter
Address: 44200 Christy Street, Fremont, CA 94538
Tel: +1 888 816 4808
Direct: +1 415 806 5899
Email: info@raisecomusa.com

Raisecom (USA Sales)
Address: 19337 US 19 N., Suite 306, 3rd Floor,
Clearwater, FL 33764
Phone: +1 727.489.2690
Fax: +1 727.547.9124
E-Mail: us-sales@raisecomusa.com

Raisecom (RUSSIA)
Address: Russia, Moscow, Str.Narodnogo
Opolcheniya, NO. 34, Office, 167
Tel(Fax): +7(499)1975613

Raisecom (Latin America Sales)
Address: 19337 US 19 N., Suite 306, 3rd Floor,
Clearwater, FL 33764
Phone: +1 727 458 8905
Fax: +1 727.547.9124
E-Mail: la-sales@raisecomusa.com

Canada Representative Office
Address: 91 Carmichael Cressent, King City,
ON, Canada, L7B 1B5
Tel: +1 905 833 3225
Fax: +1 905 833 4458
Email: winnie.lin@raisecom.com

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www.raisecom.com