T5 Compact 24GT Routing Switch

Benefits and Features

- Advanced L3, full wire speed non-blocking Routing Switch
- Ideal solution for datacenters and servers aggregation
- Ultra Compact Size – 1RU height, under 12" depth
- 24 10/100/1000BaseT ports (RJ-45) plus 4 Dual fiber/copper Gigabit Ethernet ports
- Maximum savings on infrastructure. Use a single fiber instead of two!
- Unique option for plug-in Gigabit Ethernet transceivers, including:
  - CWDM, Extra Long-Haul, Bi Directional and many more
- High level of redundancy including dual AC or DC Power Supplies
- Embedded All-Telco-Platforms uniform BiNOS Operating System - learn once for all our platforms
- Enhanced Security and Maximum Protection with:
  - SNMPv3, 802.1x, SSH, RADIUS, Secured Telnet, Advanced Access Control List (ACL), and many more
- IPv4 to IPv6 migration path and awareness
- Complete Professional Management tools for best control of your network
  - IB and OOB management with industry-standard CLI, WEB management via Embedded Java™ and unique Alarms management
  - HPOV and SNMPc integration keys
  - BiNOSCenter – your EMS platform
- Unique feature-rich support including:
  - 802.1p 8 priority queues
  - DHCP Relay & Server
  - RMON & Syslog
  - TLS for E-2-E tunneling
  - Port trunking
  - Rate limiting and Traffic Shaping for efficient bandwidth control
- Lowest power consumption in the Industry

Ultra-Compact High-Density Gigabit 10/100/1000BaseT Aggregation/Distribution Routing Switch

BATM/Telco Systems' T5 Compact Gigabit Ethernet Routing Switch provides an optimal solution for Gigabit Ethernet Intelligent Layer 3 Aggregation and Distribution services for Enterprises uses such as datacenters, mini-core applications, and many more.

The T5 Compact's super-efficient size (only 1RU in height), includes not only the capacity of physically larger backbone routing switches, but also the economy offered by workgroup switches.

T5 Compact 24GT supports 24 Gigabit 10/100/1000BaseT ports plus 4 Dual PHY plug-in miniGBIC (SFP) 1000BaseX ports. T5C-24GT supports either AC or DC feeds.

The T5 Compact Routing Switch is the optimal platform for service providers for many aspects. The T5C-24GT capabilities provide the required solution for many application needs, from the Metro Core arena to the Metro edge and enterprise boundaries, either serving as the aggregation and/or distribution layer in a Metro application or as a core device in medium and small Metro access and enterprise networks. Users can benefit from its perfect compatibility to standards (for flawless interoperability), its smooth upgradeability and scalability options with versatile interface types, and feature-rich capabilities that allow the service provider to provide any IP-driven service from a single unique platform.

Copper Gigabit Ethernet provides cost-effective high-speed links and cascading capabilities. Plug-able miniGBIC (SFP) optical Gigabit Ethernet interfaces allow network extension over large distances. Various fiber interfaces for both MM (SX), SM long-haul and extra long-haul optics, Bi-directional (single fiber usage) and CWDM modules are supported.

New Age networks demand performance, reliability, security, and connectivity. BiNOS (BATM/Telco Systems Inter Networking Operating System) provides the robust administration, management, QoS, and security performance requirements of enterprise networks by supporting a wide breadth of IEEE standards and industry conventions, such as Access Control Lists. Hardware based implementation of BiNOS mandated policies enables the T5 Compact Routing Switch to carry out Layer 2 switching and Layer 3 routing at wire speed.The T5 Compact Routing Switch provides a non-traffic affecting, L2 to L3 migration path, utilizing a single CPU.

T5 Compact Routing Switches are fully manageable via SNMP, CLI, or the Web with either In-band (IB) or Out-of-Band (OOB) management tools. The CLI complies with the de facto industry standard and enables administration via a user friendly interface. Web management is made possible by utilizing embedded Java™ based user friendly management technology.

Administrators can use industry-standard SNMP-based network management systems, or BiNOSCenter. The BiNOSCenter is BATM/Telco Systems EMS/NMS Element/Network Management System and provides the network operator with a state-of-the-art, powerful, SNMP based configuration, monitoring and maintenance platform. The BiNOSCenter can manage any SNMP-based element.

Product Technology

Performance

Wire speed Layer 2 switching, Layer 3 routing, and Layer 4 networking are made possible by use of powerful ASICs that perform all switching, routing, and policy enforcement in hardware. Concentration of services in hardware allows the T5 Compact Routing Switch to attain a surmountable performance advantage over traditional routers at a fraction of the cost. The non-blocking architecture of the T5 Compact Routing Switch ensures that even under one hundred percent traffic load with full policy enforcement no packets are lost. This combination makes the T5 Compact Routing Switch the pinnacle of performance.

Aggregation and Distribution Solution

Answering the needs of high-bandwidth aggregation or distribution applications means to be able to implement traffic aggregation among access layer equipment and provide backbone layer data switching. Distribution layer is essential to ensure high quality data communications and most important – to avoid congestion when mediating between backbone and access layers. The T5C-24GT is addressing the unique datacenters requirements by providing as many as 24 connections for up to 24 servers' aggregation.

Flexibility

One of the most important features that switches can have is their ability to conform to the needs of the network, and not vice versa. The T5C-24GT provides an ideal choice for mid-tier operators. When a relative large number of Copper Gigabit Ethernet ports is required, the T5C-24GT becomes more handy. The T5C-24GT supports 24 fixed Gigabit 10/100/1000BaseT RJ-45 ports that provides flexibility in connecting up to 24 gigabit high-speed services (such as servers) into a single 1RU advanced Layer 3 platform. In addition, 4 plug-in miniGBIC (SFP) 1000BaseX ports provide variable-distance overcoming and any-fiber type compliancy in aggregating the copper lines into the backbone, remote, network. The Gigabit Ethernet ports variety, both copper and optical helps the service provider with any desired interface type combination. CWDM, long-haul and Bi-directional (single fiber usage) transceivers support provides a wide offering to any application type requirement.

Features

The T5 Compact Routing Switch, under the BiNOS umbrella, incorporates a large number of features, such as IEEE 802.3ad link aggregation, IEEE 802.1q VLAN, IEEE 802.1d Spanning Tree Algorithm, 802.1w and 802.1s Rapid and Multiple Spanning Tree Algorithm, IEEE 802.3x Flow Control and Backpressure, Resilient Ports, IGMP, Access Control Lists, bandwidth reservation, DHCP server/ relay with option 82 support, Diffserv and IEEE 802.1p based Quality of Service with eight (8) priority queues.

• Link Aggregation (802.3ad & LACP)

Link Aggregation helps broaden the bandwidth between different switches dynamically. This important feature helps circumvent possible network bottlenecks by aggregating bandwidth on crucial network connections. In addition to adding robustness, link aggregation also serves as a form of redundancy by ensuring that even if one link fails, all network traffic will still be propagated over the remaining links in the aggregation group.

• Virtual LANs

Virtual LANs allow network administrators to improve bandwidth capabilities and reduce administrative overhead by segmenting users into different logical groups that adhere to corporate policies. In order to implement a VLAN across a network the T5 Compact Routing Switch supports the full 4K range of VLANs according to the IEEE 802.1q standard and auto-VLAN detection capabilities.

• IGMP Multicast Support

Network multicasts are geared toward reducing the amount of bandwidth needed for applications like video-conferencing and online learning. Hardware support for IGMP allows the T5 Compact Routing Switch to forward only single copies of transmissions to destination ports. The T5 Compact Routing Switch has the unique ability to automatically recognize IGMP join and leave messages, freeing network administrators from the strain of multicast management.

• Security and Policy Enforcement

Network security and policy enforcement consists of RADIUS and Secure Telnet for access, port-based MAC security and user-defined rules that determine how, where, and when various network functions are performed. While many early implementations focused on QoS across a number of network devices, the goal of policy-based networking is to allow the management of any type and number of policies across a network. BiNOS SSH server provides a more secure connection by providing authenticated services. In addition, all BATM/Telco Systems Routing Switches support IEEE 802.1x and SNMPv3 authentication features for enhanced security and encryption applications.

• Access Control Lists

The T5 Compact Routing Switch's wire speed Access Control Lists (ACLs) enable the implementation of QoS, security, and marking for Differentiated Services at DiffServ Code Points upon entry to the switch. ACLs ensure that only authorized users have access to specific resources and block any unwarranted attempts to reach network resources. The policies implemented in the ACLs are used to provision bit rates IP or applications.

• Quality of Service

Quality of Service is vital to ensure proper flow control and bandwidth management in a network. Eight (8) priority queues give the T5 Compact Routing Switch the capability to differentiate between time sensitive VoIP applications and other network data transmissions. In addition to IEEE 802.1p support, the T5 Compact Routing Switch also supports Differentiated Services (Diffserv). Diffserv is used for specifying and controlling network traffic by class so that certain types of traffic get precedence. Diffserv avoids simple priority tagging and depends on a policy which determines how to forward a given network transmission. One of the T5 Compact Routing Switch's more unique qualities is its ability to provide adaptive bandwidth control. Thresholds can be set by using Weighted Random Early Detection (WRED) to start segregating TCP traffic when it exceeds a given threshold. This allows networks a great amount of flexibility and the ability to avoid unnecessary static bandwidth provisioning.

Routing & Multicast Routing

Layer 3 routing capabilities are critical for improving network utilization. Routers are responsible for forwarding packets towards their destinations via adjacent networks. Routers "decide" which way to forward a packet based on the current state of the connected networks. Special network routing hardware enables the T5 Compact Routing Switch to perform MAC resolution, CRC checks, and TTL updates on a packet-by-packet basis at wire speed. The information used to forward packets is gathered by using special protocols, such

as Routing Information Protocol (RIP), Open Shortest Path First (OSPF) and Border Gateway Protocol 4 (BGP4). When routing between VLANs, the T5 Compact Routing is capable of replacing the 802.1Q based VLAN tags at wire speed. The T5 Compact Routing Switch VRRP eliminates the single point of failure inherent in the static default routed environments. The T5 Compact Routing Switch supports Routing Multicasts features such as PIM (Protocol Independent Multicast).

Standards

IEEE 802.3 CSMA/CD method and physical layer specifications
IEEE 802.1d Spanning Tree Algorithm
IEEE 802.1p Priority Queuing, IEEE 802.1q VLAN tagging
IEEE 802.1w Rapid Spanning Tree, IEEE 802.1s Multiple Spanning Tree
IEEE 802.1x Authentication, IEEE 802.3ac VLAN Tagging
IEEE 802.3ad Link Aggregation, IEEE 802.3x Flow Control
IEEE 802.3 Ethernet, IEEE 802.3u Fast Ethernet
IEEE 802.3z Gigabit Ethernet, RFC 768 UDP
RFC 791 IP, RFC 792 ICMP, RFC 793 TCP, RFC 826 ARP
RFC 854 Telnet Client & Server, RFC 862 Echo Protocol
RFC 863 Discard Protocol, RFC 867 Daytime Protocol
RFC 868 Time Protocol, RFC 904 Exterior Gateway Protocol Formal Specification
RFC 919 Broadcasting Internet Datagrams
RFC 922 Broadcasting Internet Datagrams in the Presence of Subnets
RFC 951 BootP, RFC 1024, 1035 Domain names
RFC 1027 Using ARP to Implement Transparent Subnet Gateways
RFC 1042 Standard for the Transmission of IP Datagrams over IEEE 802 Networks
RFC 1058 RIP, RFC 1059, 1119 NTPv1/2
RFC 1112 IGMP, RFC 1122 Host Requirements
RFC 1166 Internet Numbers
RFC 1256 ICMP Router discovery protocol
RFC 1267 A Border Gateway Protocol 3 (BGP-3)
RFC 1305 Network Time Protocol, NTPv3, RFC 1350 TFTP
RFC 1388 RIP Version 2 Carrying Additional Information
RFC 1403 BGP OSPF Interaction
RFC 1519 CIDR (Classless Inter-domain Routing)
RFC 1542 Bootstrap Extensions
RFC 1587 OSPF NSSA, RFC 1661 PPP, RFC 1701 Generic Routing Encapsulation
RFC 1702 Generic Routing Encapsulation over IPv4 Networks
RFC 1723 RIP V2, RFC 1771 BGP4*
RFC 1745 BGP4/OSPF*, RFC 1765 OSPF Database Overflow
RFC 1812 Requirements for IP Version 4 Routers
RFC 1851 The ESP Triple DES Transform
RFC 1866 HTML, RFC 1965 Autonomous system configuration for BGP
RFC 1966 BGP Route Reflection*, RFC 1997 BGP Communities Attribute*
RFC 2131 DHCP Server, RFC 2132 DHCP Options and BOOTP Vendor Extensions
RFC 2138 RADIUS, RFC 2139 RADIUS Accounting*
RFC 2236 IGMPv2, RFC 2328 OSPF V2
RFC 2338 VRRP, RFC 2362 PIM-SM/DM
RFC 2370 The OSPF Opaque LSA Option
RFC 2439 Route Flap Damping, RFC 2453 RIPv2
RFC 2474 DiffServ Precedence, RFC 2475 DiffServ Core and Edge Router Functions
RFC 2597 DiffServ Assured Forwarding
RFC 2598 DiffServ Expedited Forwarding, RFC 2644 Directed Broadcasts
RFC 2697 A Single Rate Three Color Marker
RFC 2698 A Two Rate Three Color Marker
RFC 2792 DSA and RSA Key and Signature Encoding for the KeyNote TMS
RFC 2865 Remote Authentication Dial In User Service (RADIUS)
RFC 3046 DHCP Relay Agent Information Option
RFC 3084 COPS-PR*, RFC 3140 PHB Identification Codes
RFC 3222 Forwarding Information Base (FIB) , DVMRP v3*
GMRP, GVRP, RSVP*, SSH2, PVST, SNMPv3, IGMP snooping, BiNOS enabled
* - future implementation

Interfaces

10/100/1000BaseT, 1000BaseT:
Connectors: RJ-45, SFP RJ-45
Transmission: Full/Half-Duplex
Range: 100m
1000BaseSX/1000BaseLX:
Connectors: SFP LC
Transmission: Full/Half-Duplex
Optical Budget: 9db
Fiber: 50/125 micron, 850nm, 9/125 micron, 1310nm
Range: 550m (50/125), 10km (9/125)

Routing Characteristics

Technology:	ASIC based parallel Store-and-Forward
Bridging:	IEEE 802.1d Spanning Tree Algorithm
Address Table:	16K MAC addresses
Forwarding Rate:	Up to 148,800 pps / 100 Mbps ports Up to 1,488,000 pps / 1 Gbps ports
Flow Control:	802.3x for full duplex. and back-pressure for half duplex transmission

Routing Characteristics

Technology:	ASIC based IP routing
Address Table:	256K IP Addresses, 16 default gateways
Forwarding Rate:	Up to 148,800 pps / 100 Mbps ports Up to 1,488,000 pps / 1 Gbps ports

Management:

STD-15 SNMPv1, STD-16 SMIv1, STD-17 MIB-II, STD-50 EtherLike MIB, STD-58 SMIv2, STD-59 RMON, STD-62 SNMPv3, SNMPv2c, SNMPv1, RFC2668 MAU, RFC2925 Ping MIB, BATM/ Telco Systems Private MIBs

CLI:	Serial, Telnet, SSH
Internet:	JAVA-based Web management
Interface:	In-Band/ Out-of-Band
Local Interface:	RJ-45, RS-23
SW Download:	via TFTP

Management Features:

VLANs:	Up to 4k VLANs per 802.1q
Bridging:	Spanning Tree, Aging
Class of Service:	8 queues per port
Monitoring:	Single/Multi port mirroring

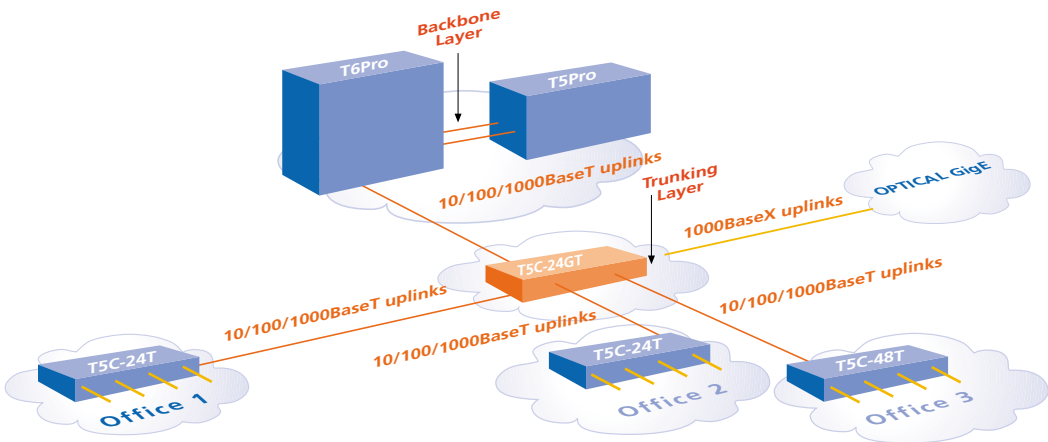
General:

Dimensions: (W) 483 x (H) 44 x (L) 305 mm
(19" x 1U x 12")
Power: 36-60VDC, 100-240 VAC, 50/60 Hz, 120W max.
Weight: 5.2 kg (11.5 lb
Operating Temp.: 0°C - 45°C
Humidity: up to 90%, non-condensing

Safety & Electro Magnetic Compatibility:

Safety – EN/IEC 60950, EN 60825
EMC - EN55022

Aggregation and Disribution Layer Solution



Specifications

Ordering Information

Chassis and Power Supplies

Part Number	Description
BTI-0524GT	T5C-24GT Compact routing switch with 24 fixed Gigabit Ethernet 10/100/1000BaseT ports and 4 unpopulated 1000BaseX miniGBIC (SFP) Dual PHY ports, AC power supply.
BTI-0524GT-D	T5C-24GT Compact routing switch with 24 fixed Gigabit Ethernet 10/100/1000BaseT ports and 4 unpopulated 1000BaseX miniGBIC (SFP) Dual PHY ports, DC dual-feed power supply.
BTI-0524GT-2A	T5C-24GT Compact routing switch with 24 fixed Gigabit Ethernet 10/100/1000BaseT ports and 4 unpopulated 1000BaseX miniGBIC (SFP) Dual PHY ports, AC redundant power supplies.

1000Mbps miniGBIC (SFP) Modules

Part Number	Description	Connector	Distance
BTI-MGBIC-GLX-LC	1 port 1000BaseLX Single Mode Mini GBIC transceiver (1310nm)	LC	10km
BTI-MGBIC-GSX-LC	1 port 1000BaseSX Multi Mode Mini GBIC transceiver (850nm	LC	550m
BTI-MGBIC-GTX	1 port 1000BaseT Mini GBIC transceiver	RJ-45	100m

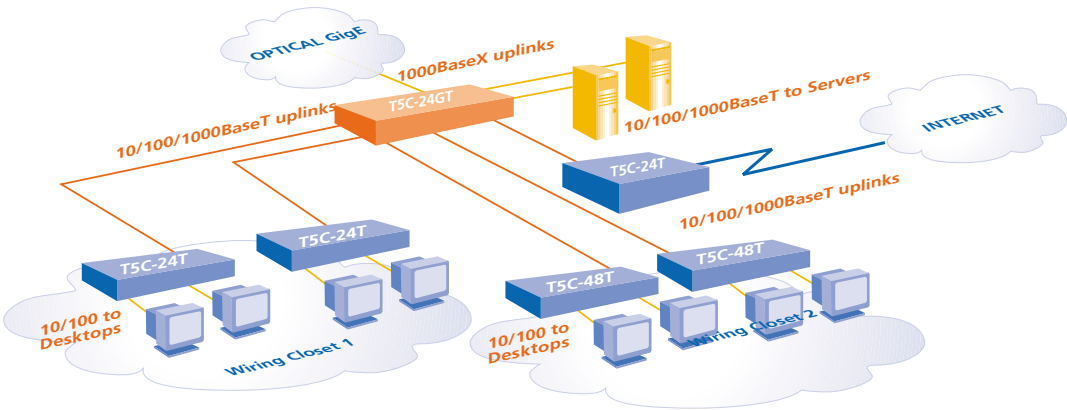
Operating Software

BiNOS-Multi-L-Adv.	BiNOS-Multi-L + OSPF, BGP, PIM

Elements Management Software

BiNOSCenter- Single User	Elements Management System for Single User license
BiNOSCenter- Multi User	Elements Management System for Multiple Users license
BTIView-OVW SNMP	GUI for HP's OpenView management software
BTIView-SUN SNMP	GUI for HP's OpenView management software for Sun Systems
BTIView-WIN SNMP	GUI for Castle Rock's SNMPc management software

Branch Office Aggregation Scenario



AIRLINX Communications, Inc.
Box 253
Greenville, NH 03048
E-mail: sales@airlinx.com
Tel: (888) 224-6814
Fax: (603) 878-0530