

UX2000 Solution Brief

Unified Exchange: Next Generation Platform For Real-Time Services

High performance mediation platform for UC & Enterprise SBC, qualified for Microsoft® Office Communications Server (OCS) R2 and Lync™ Server 2010



UX2000 Series All-in-One Branch Office Networking Appliance with Integrated Application Services Module

VAR BENEFITS

- Offers scalable architecture for all customer types – from small branch to large corporate datacenters
- A modular customer premise equipment (CPE) packaged into a single box solution provides unique capabilities for invest-as-you-grow model enabling service up-sale
- Solves integration problems with existing telecom equipment
- Provides a true high capacity Any-to-Any switching through support for a wide choice of codec transcoding and protocol mediation
- Reduces branch office deployment complexity with a single box form factor for both voice and data
- Shortens applications deployment time and reduces cost
 - Powerful Applications Solutions Module allows VARs to host value added applications without needing a separate server hardware

CUSTOMER BENEFITS

- Multi-function appliance reduces both capital and operational expenses by eliminating the need to purchase a Router, a PSTN gateway, an SBC and an application server
- Modular architecture allows customers to select only the options they need. Customers can choose to keep their existing routers or replace multiple devices with a single appliance
- Highly secure User Interface simplifies management and configuration for Lync Server 2010 deployments
- Integrated Application Solutions Module can be used for hosting 3rd party applications and reduces number of servers and IT management complexity
- Built-in Session Border Controller ensures both voice and data applications are secure
 - Includes TLS, SRTP, IPSec for enhanced security
 - Mitigates against denial of service attacks
 - Provides Topology hiding
- Web-based management, Syslog, and SNMP monitoring simplifies day-to-day management and operations
- Active Directory/LDAP integration provides simplified deployment and management
- Appliance form factor with hardened OS simplifies maintenance

SERVICE PROVIDER BENEFITS

- Modular and scalable architecture provides flexibility in designing the right Customer Premise Equipment for SIP Trunking
- Microsoft OIP Qualification ensures Microsoft Lync Server 2010 deployment is supported by Microsoft
- Support for a wide variety of TDM and IP based PBXs ensures smooth integration of Microsoft UC

OVERVIEW

The NET Unified Exchange 2000 (UX2000) is a modular multi-function, high performance mediation platform that delivers cost savings, reduces management complexity, and increases reliability for branch office networking and communications needs. The core features include Layer 2 and Layer 3 based routing protocols, GigE switching, T1/E1, WAN and LAN ports, Firewall with traffic inspection, Session Border Controller (SBC), media processing through advanced high-density Digital Signal Processors (DSPs), PSTN gateway, and an Application Solutions Module (ASM) for hosting third party applications.

The UX2000 is fully managed using a highly secure Web-based management interface. It is an ideal solution for remote sites/branch offices that have minimal IT support. The modular architecture allows deployment flexibility for different size locations and can easily scale up for future expansion. It can be deployed for a variety of applications such as next-generation VoIP and Unified Communications; SIP Trunking; Wideband (HD Voice) transcoding; Multi-service Business Gateway (MSBG); and for multi-service applications like Pseudo-wire.

UNIFIED COMMUNICATIONS (OCS R2, LYNC SERVER 2010) AND VOICE-GATEWAY SERVICES

The NET UX2000 appliance offers extraordinary service integration of Unified communications to any size branch office. Businesses enjoy the benefit of deploying a single device for all networking and communication needs and save both capital and operational expenses.

By supporting a variety of protocols, advanced security, codec transcoding, and data services, the UX2000 enables a distributed enterprise to cost-effectively implement Unified communications across the enterprise.

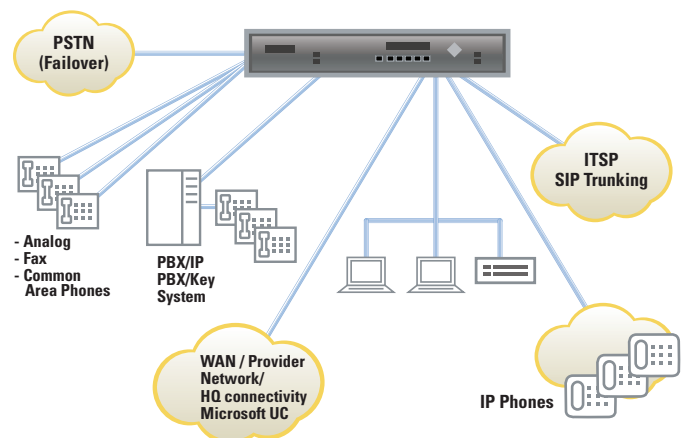


Figure 1: Branch Office Demarcation device with Microsoft SBA, Routing & Switching, and SBC

ARCHITECTURE AND MODULARITY

The UX2000 is architected to meet the demands of any size branch office and can scale to up to 1000 users. Its design flexibility provides unique capabilities for invest-as-you-grow model and allows for future growth both in terms of the number of users supported as well as in the number of applications deployed in the future.

The modular architecture is designed to support scaling up of digital signal processing capacity and Time Division Multiplexing (TDM) interconnections.

The ASM that is based on the most current generation of Intel processors (Core i7 based CPU) has enough processing power to concurrently host several third party applications.

The table 1 lists the architectural features and benefits of using the UX2000 Series appliance.

Table 1: UX2000 appliance Architectural Features and Benefits

Features	Benefits
Modularity	<ul style="list-style-type: none"> The UX2000 is a highly modular platform and supports a variety of telco and data modules for connectivity requirements of all kinds of deployment scenarios – small branch office to a large enterprise datacenter. The UX2000 appliance offers high speed GigE LAN and WAN connectivity and the SFP modules allow for future growth without replacing the module.
Digital Signal Processors	<ul style="list-style-type: none"> The UX2000 is powered by powerful Digital Signal Processors. Each chassis can have up to six high density DSP modules. The modular interfaces offer diversity of DSP options to meet different capacity needs depending upon the application requirements
Gigabit Ethernet Fabric	<ul style="list-style-type: none"> The UX2000 switching fabric efficiently allows high speed inter module communication. This reduces the latency for improved media and data performance
TDM interfaces	<ul style="list-style-type: none"> The UX2000 Series allows for TDM connectivity with up to 8 T1/E1 spans External and hot swappable TDM interface modules can be field replaced
Gigabit Ethernet Ports	<ul style="list-style-type: none"> The UX 2000 can support up to four 10/100/1000BASE-T Ethernet ports for WAN interfaces
USB based management access	<ul style="list-style-type: none"> USB ports allow for management access and logging. There are four USB ports available
Applications Solution Module (ASM)	<ul style="list-style-type: none"> The Applications Solution Module is powered by an Intel Core i7 Processor with DDR3 ECC memory The multi-core processors can support growing demand of the branch offices and for running multiple applications simultaneously Enterprises can run a variety of applications including Microsoft Survivable Branch Appliance software for Microsoft UC in a single appliance

KEY FEATURES

Converged Communications Platform

The UX2000 provides a complete portfolio of services needed for branch office communications. The UX platform's modular design delivers integrated and co-existent services in a single platform offering operational efficiency and reduced costs. The platform includes a comprehensive set of integrated modules that deliver T1/E1/PRI gateway, routing and switching capabilities, LAN and WAN

access, TDM and IP mediation, Session Border Controller (SBC), firewall, and an embedded secure and hardened Intel based platform for running applications like Microsoft Survivable Branch Appliance (SBA).

Full Featured PSTN Gateway

The UX2000 offers a true Any-to-Any protocol translation and media interworking between SIP, TDM signaling, DTMF encoding while supporting a large number of codecs used in VoIP networks.

The network interfaces come in traditional analog (FXO/FXS) and digital (T1/E1) flavors. TDM signaling support includes T1/E1 Primary Rate Interface (PRI), T1 Channel Associated Signaling (CAS), E1-R2, T1/E1 QSIG protocol, Foreign Exchange Office (FXO), and Foreign Exchange Station (FXS).

Table 2: UX2000 PSTN Gateway Features and Benefits

Features	Benefits
E1-CAS MFC R2; T1-CAS E&M, FXO, FXS, T1/E1 ISDN PRI QSIG (call diversion, call forward, call transfer, calling ID, Message Waiting Indicator (MWI))	Connection to a PBX, key system, or PSTN
In-band DTMF (RFC 2833, SIP INFO)	
Gateway PSTN fallback	When the WAN interface is lost, the UX2000 provides PSTN interface for the branch office. The gateway also supports registration of IP phones for providing basic call handling features for the branch office. The UX2000 can provide PSTN fall back mechanism for ensuring continuous availability of voice services in the branch offices.
Group III fax	Supports transmitting Group III fax between PSTN and IP networks using fax relay or fax pass-through methods
T.38/FoIP	Supports T.38 protocol between PSTN and IP. Provides support for Fax over IP networks. It can also be used to deliver faxes into IP Fax servers.
Codecs supported <ul style="list-style-type: none"> G.711 (64 kbps – A-law, Mu-law) G.723.1 (5.3 kbps, 6.3 kbps) G.729 A&B (8 kbps) 	
Voice Activity Detection (VAD)	Conserves bandwidth when there is no voice traffic between the parties
Comfort Noise Generation	Some noise is generated to prevent user from thinking that the call is disconnected when VAD is used
Signaling and Media encryption using TLS and SRTP	Encrypts signaling using TLS and media using SRTP to comply with Microsoft Lync Server 2010
RFC 4244: History Info in SIP	Supports History-Info header to transport history of the call
Link Quality Management	Provides network awareness for automatic re-routing

The software modules provide advanced capabilities such as SIP Trunking, integrated IP – IP mediation, bandwidth optimization, voice encryption, and branch office survivability. These advanced features deliver secure IP-based voice networking, Unified communications, Unified messaging, and interoperability with existing TDM and IP-based voice networks.

The table 2 lists the features and benefits of the PSTN gateway functionality of a UX2000 mediation platform.

The UX2000 delivers several advanced features. The appliance provides several high-end features like Intelligent Call Routing with failover, Site Survivability, Security, and Web based management that are ideal for customers looking for cost-effective VoIP and PBX connectivity.

CALL ROUTING FEATURES

- **Call routing based on ANI, CLID, DNIS, SIP URI**
- **Post route digit translation**
- **Outbound PSTN Trunk group selection via routing table or RFC4904**
- **Failover routing**

THE UX 2000 SERIES APPLIANCE SUPPORTS THE FOLLOWING ROUTING FEATURES

- **IP Networking Support**
 - **IPv4 IP, TCP, UDP, ICMP, ARP, RARP**
 - **DNS client**
 - **Static routing**
 - **Static interface configuration**
- **Security And Access**
 - **Stateful Packet Inspection Firewall**
 - **Inbound and Outbound Access Control**

Intelligent Call Routing

The UX2000 features an ability to connect standard telephones and fax machines to IP-based data networks. Users will be able to reach a called party's alternate phone service such as a mobile phone by automatically routing calls to their mobile phones. If the WAN service is down, calls can be directed to PSTN carrier.

Users can reduce and even eliminate international long distance telephone charges by first calling the local telephone number. The advanced call routing intelligence in the UX2000 will route the call via the LAN, WAN or a SIP Trunking service provider to the far end destination.

Additionally, when another UX2000 is deployed at the far end, calls placed to that location can be either answered or further processed and routed as a local PSTN call, local PBX call, mobile call, or routed to the local Microsoft Office Communicator client.

The UX2000 can monitor the quality of the network by sending "I'm alive" messages in order to check the health of the network. By collecting statistics such as average expected round trip delay, average packet loss, and the next node's availability, the UX2000 platform's routing engine can try alternate routes to ensure the best voice quality is always maintained.

The UX2000 supports POTS (Plain Old Telephone Service) FXS port to connect to existing analog phones, common area phones, or fax machines. The Microsoft Lync Server 2010 call control features like transfer are delivered to these devices. The PSTN FXO ports are used to connect to the PSTN telecom circuit or to a PBX. Finally, the UX2000 can also trigger routing based on quality metrics.

Remote Site Survivability

The UX2000 helps ensure the branch office employees have uninterrupted telephony services even when the physical connection to the headquarters is disrupted.

In environments where a branch office depends on the WAN connection to the IP telephony system in the data center, the UX2000 acts as the local analog gateway for restoring basic telephony services such as incoming and outgoing calls to the PSTN. This feature provides telephony survivability and business continuity for branch office sites in the event the IP network connection fails.

Full Feature Routing Capabilities

The UX2000 allows for support of standards based switching, static routing, NAT, and other Layer 2 and Layer 3 protocols.

With its industry standard Layer 2 and Layer 3 routing protocols and complemented with the state of the art networking technology, the UX2000 has a non-blocking IP core capable of routing more than 35 million packets per second. With such high performance IP core, the UX2000 can perform line-rate switching and routing for any size branch office.

The UX2000 is equipped with four 10/100/1000 BASE-T Ethernet ports which can support Small Form Factor Pluggable (SFP) connectivity which enables optical fiber based LAN/WAN connectivity. The following SFP devices are supported:

- Copper SFP – 1000BASE-T
- Fiber SFP- 1000BASE-T
- Fiber SFP-Long Wavelength 1000BASE-LX

The Auto-MDIX on all the ports simplifies installation and reduces cabling errors.

The UX2000 offers IPv4 routing and supports industry standard routing capabilities and protocols - Open Shortest Path First (OSPF), RIP v1/2, 802.1Q & 802.1P VLAN, QoS.

The UX2000 appliance supports advanced Layer 2 switching functionality that includes VLAN, spanning tree protocols, Ethernet MAC bridging, multicast features, Link aggregation, and Port authentication among many other features.

Integrated Application Solution Module

The UX2000 appliance has an integrated fully independent, easy to install and manage, Intel processor based Applications Solution Module (ASM) to enable businesses to easily host third party applications.

The ASM has its own high performance Intel Core i7 processor. Storage is provided through a Serial ATA (SATA) drive. The ASM includes error correcting memory (ECC).

The ASM allows a branch office to consolidate application servers to reduce costs and allow branch offices to deploy applications in the branch office rather than relying on the data center servers.

The third party applications on the ASM are configured and managed centrally by the UX2000 management console. Because of this tight integration, the ASM application appears to the end-user as an extension of the UX2000 appliance.

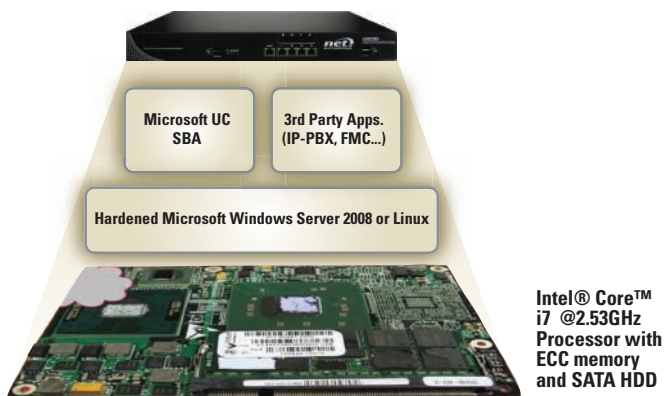


Figure 2: UX2000 with Integrated Applications Solution Module

The ASM allows businesses implement new services cost effectively and is useful as a standalone solution for Microsoft CS Survivable Branch Appliance or for integrating business applications like IP-PBXs. The table 3 lists the features and benefits of the ASM in a UX2000 appliance

Table 3: UX2000 ASM Features and Benefits

Key Feature	Benefit
Application Server	<ul style="list-style-type: none"> • Reduce both capital and operational costs • Centralize and Consolidate application server infrastructure • Provide a consistent management interface across all applications
High performance hardware with ECC memory	<ul style="list-style-type: none"> • Platform for high demanding applications • ECC memory ensures Microsoft WHQL certification • ECC memory ensures high reliability
Centralized management and troubleshooting	<ul style="list-style-type: none"> • Simplifies administration tasks through management of the appliance using a common Web-based GUI interface

Integrated Management Capabilities

The Web based tool lets the network operator remotely configure the UX2000 appliance in real time lowering operational expenses. The operator can see the top-level view of the relationships between the chassis, telephony cards, DSP modules, channels, and ports. It also allows the user to configure IP Interfaces, routing protocols, calling routes, and digit manipulation.

The Web-based GUI interface can also be used for real-time monitoring of channels and alarm activity. The integrated Web-based monitoring tool provides real-time monitoring of all channels and alarm activity in the UX2000 nodes and allows network operators to view real-time call data.

The ASM is monitored through the same Web-based GUI interface. The ASM is periodically checked with the help of keep-alive messages to check whether critical functions of the ASM are still running. If the ASM does not respond to the keep-alive messages, critical alarms are generated so proper action can be taken by the administrator.

The UX2000 uses standard Simple Network Management Protocol (SNMP) MIBs and syslogs for management using any third party network management systems like SCOM and HP Openview/NNMi.

Integrated Session Border Controller

As business organizations grow, scaling, managing, and controlling the enterprise edge demarcation becomes important. The demarcation device needs to process voice traffic, manage denial of service (DoS) attacks, secure user’s voice connections, enforce user-defined policies, encrypt and de-encrypt signaling and media with negligible latency, jitter, and loss. The UX2000 appliance enables direct IP-to-IP interconnection between multiple domains and provides protocol interworking, security, call admission control, codec transcoding, and quality of service (QoS).

CALL ADMISSION CONTROL (CAC)

Additionally, voice quality is ensured by enforcing Call Admission Control (CAC). CAC functionality is ensured through counting the number of calls till a threshold is reached

SECURITY

DoS and Man-in-the-Middle attacks

The UX2000 has a full complement of integrated port security and Layer 2 security features to defend against threats like ARP spoofing, man-in-the-middle attacks, and Denial of service attacks. The UX2000 will use rate limit techniques on incoming ARP packets to prevent the denial of service attacks.

The UX2000 comes with the Unicast Reverse Path Forwarding feature that helps in mitigating problems like denial of service attacks caused by spoofed IP addresses. The router forwards only those packets that have a valid IP address.

Media and Signaling Encryption

The voice conversation and the SIP signaling are encrypted rendering the voice unintelligible to any eavesdropper. The UX2000 supports Secure Real-Time Transport Protocol (SRTP) as defined in RFC3711. SRTP provides confidentiality, message authentication, and replay protection to the media traffic in the RTP packets and supports the AES encryption algorithm.

The media encryption using SRTP is done in the integrated DSP modules. Because the processing is done in the DSP module directly integrated into the appliance and not mounted on the T1/E1 interface card, the number of secured calls can be increased by adding additional DSP modules. Media encryption can also be performed on IP to IP calls where no T1/E1 card is used.

The media encryption on the UX2000 appliance provides a highly secure communications between TDM and IP networks across a WAN or a LAN.

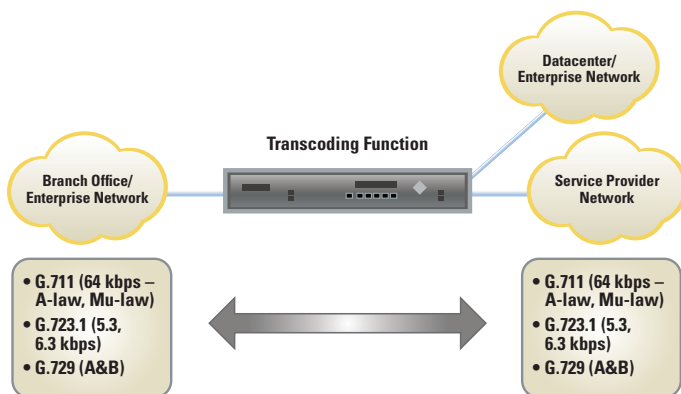


Figure 3: UX2000 appliance with integrated DSPs

SRTP is used to encrypt voice calls between TDM /VOIP phones and Microsoft MOC clients in the branch office or in the headquarters. Similarly, secured calls can be placed between branch offices or between a branch office and the headquarters connected over the IP networks. In this case, the UX2000 appliance acts as a security gateway or an interworking gateway.

Topology Hiding

The UX2000 hides those parts of the routing-related headers that reveal the internal network topology of the voice networks while simultaneously ensuring that the headers are usable.

Transcoding

The UX2000 appliance integrates powerful Digital Signal Processors (DSP) as daughter boards to the motherboard. These DSPs provide flexible packet processing engine for both packet to Time Division Multiplexing (TDM) and packet-to-packet networks. The DSPs provide transcoding service across a variety of voice codecs and ensures high-quality voice delivery across legacy circuit-switched network and IP-based networks. The DSP's are available in systems without T1/E1 or Analog interfaces and allows the UX2000 to support the modern IP only networks.

The onboard DSPs handle a full spectrum of voice processing functionality like echo cancellation and noise suppression. Each chassis can have up to six high density DSP modules. The UX2000 appliance's modular design offers a diversity of DSP options to choose from.

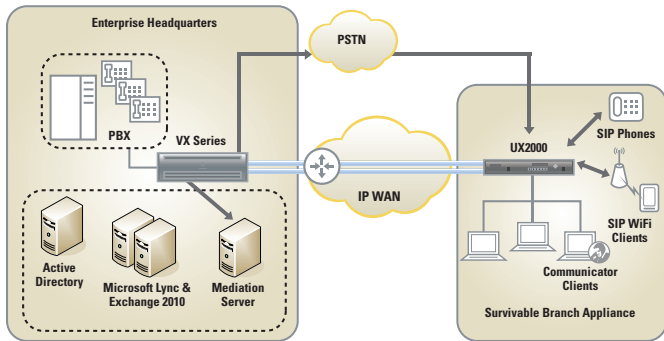
DSP PRODUCT FEATURES

- **Echo Canceller**
 - G.168-2004 compliant
 - Echo Tail up to 128 ms
- **G.711u-law, A-law, Appendix I & II**
- **G.723.1 with annex A**
- **G.729 with annex A, B**
- **T.38**
- **Modem pass-through**
- **Tone detection/generation**
- **Comfort noise generation**

COMMON APPLICATION SCENARIOS

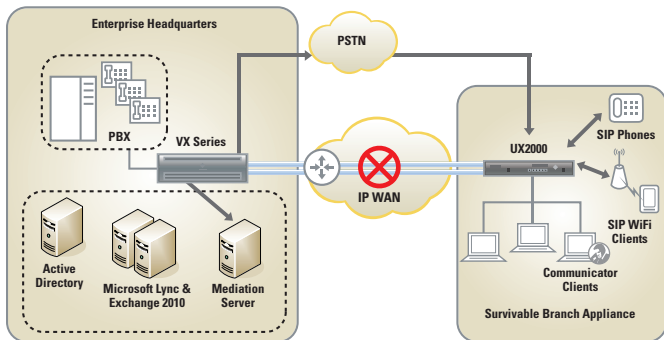
ENTERPRISE BRANCH OFFICE CONNECTIVITY AND SURVIVABILITY FOR MICROSOFT LYNC SERVER 2010

Normal Mode:



In the normal mode, the UX2000 appliance in the branch office is connected to the Microsoft Lync Server 2010 in the datacenter over a WAN network. IP phones are registered with the UX2000. Microsoft Lync Clients 2010 are registered with the integrated Microsoft Survivable Branch Appliance.

WAN Outage:

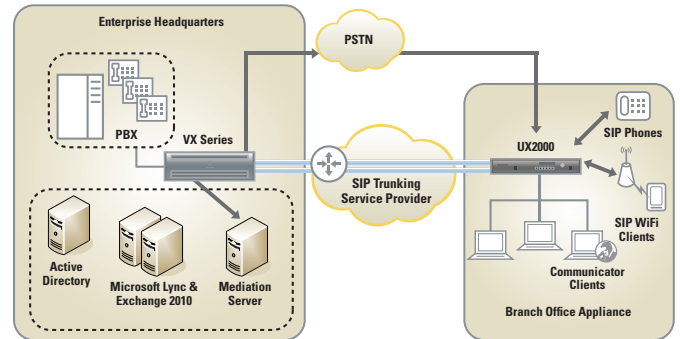


The UX2000 Survivable Branch Appliance (SBA) provides basic voice services to branch office users during a WAN outage. During WAN outage, the SBA appliance manages the intra-branch voice calls and IM sessions as well as inter-branch communications and voice mail retrieval over PSTN.

UX2000 Benefits:

- Multiservice Router and VoIP gateway with Branch office Survivability
- Session Border Controller with NAT function, Network topology hiding, and Security
- Single appliance for running concurrent applications
- Continued branch office operations through WAN failure

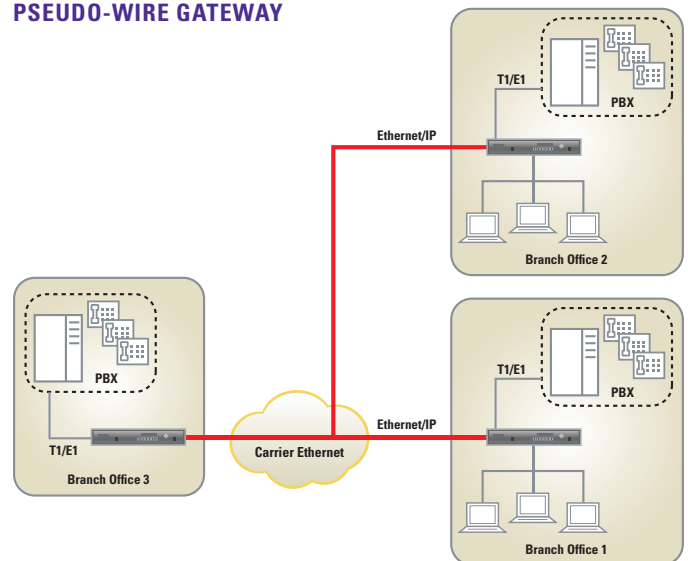
SESSION BORDER CONTROLLER



UX2000 Benefits:

- Provides easier interoperability with SIP Trunking service providers
- Any-to-Any switching capabilities ensure wide range of voice platforms
- High Availability and Call Admission Control protection to avoid signaling flooding
- Enables validation of Service Level Agreements by measuring QoS and CAC to monitor voice connections
- B2BUA functionality provides full secure management of voice traffic through encryption and by preventing Denial of Service attacks
- Advanced routing and control scenarios include least cost routing, Call quality based routing, and intelligent routing based on Active Directory integration
- Enables real time evaluation of network and route performance
- Edge demarcation device
- Provides call accounting interface through RADIUS AAA server and ODBC interface
- Provides media transcoding & DTMF format interworking

PSEUDO-WIRE GATEWAY



Virtual Private Wire Services (VPWS) or Pseudo Wire Emulation (PWE) feature in the UX2000 provides cost-effective integration of voice and data services as well as point-to-point connectivity between customer sites.

The UX2000 appliance allows backhaul services for traditional T1/E1 services and PBX voice over IP based networks. In addition to backhaul services, the UX2000 enables aggregation and service interworking of IP and Layer 2 circuits into Gigabit Ethernet interface for integration with edge routers and switches.

SPECIFICATIONS

Physical PSTN Interfaces	
Digital Modules	• 8 T1/E1 spans per module
Analog Modules	
Networking Interfaces	
WAN and LAN Interfaces	<ul style="list-style-type: none"> • 4 10/100/1000 BASE-T • Auto-MDIX • 1 10/100/1000 Base-T management port
Applications Solutions Module	
CPU	Intel® Core™ i7 @2.53GHz
Memory	4 GB DDR3 with ECC
Storage	160 GB SATA HDD Blade Server
Software Features	
Any-to-Any Switching	<ul style="list-style-type: none"> • SIP (UDP, TCP, TLS) • PRI, Q.SIG • Media Encryption (TLS, SRTP)
Call Routing	<ul style="list-style-type: none"> • Active Directory/LDAP based call routing • Routing based on quality metrics • Least cost routing • Event based Action Set
Supplementary Services	<ul style="list-style-type: none"> • Call hold • Call Transfer – Blind and Assisted • Call Forward
Signaling	
TDM Signaling	ISDN: AT&T 4ESS, AT&T 5ESS, Nortel DMS-100, Euro ISDN (ETSI 300-102), Q.SIG, NTT InsNet (Japan), and ANSI National ISDN-2 (NI-2)

HARDWARE SPECIFICATIONS

Equipment	Height mm/in	Width mm/in	Depth mm/in	Weight lb/kg
Chassis with no interface cards or expansion modules	(1RU) – 44 mm/1.75 in	444 mm/17.5 in	534 mm/21 in	16.5 lbs/7.8 Kg
Fully loaded	(1RU) – 44 mm/1.75 in	444 mm/17.5 in	534 mm/21 in	16.5 lbs/7.8 Kg

By using the VPWS feature on the UX2000, customers can keep the same layer 2 connections to the service provider but instead of sending the data in ATM or Frame Relay service, the traffic is encapsulated and routed over IP/MPLS network.

Voice Features	
Codecs	<ul style="list-style-type: none"> • G.711 (64 kbps – A-law, Mu-law) • G.723.1 (5.3 kbps, 6.3 kbps) • G.729 A&B (8 kbps)
Call Type Detection	Automatic call type detection – voice, fax, or modem
Call Progress Tones	Generate call progress tones – ring-back
Advanced voice quality features	<ul style="list-style-type: none"> • G.168 Echo Cancellation up to 128 ms tail length • Voice Activity Detection (VAD) • Comfort Noise Generation
Fax over IP	T.38 with CNG tone detection
Voice Quality Monitoring	Jitter, Delay, and Packet Loss
Session Border Controller	
Security	<ul style="list-style-type: none"> • Encryption (TLS, SRTP) • Built-in VoIP firewall • Denial of Service mitigation • DNIS, CLID, call type pre-authentication • Topology Hiding • Call Admission Control
Branch Survivability	
Management	
QA&M	HTTP, HTTPS Syslog SNMP v2
Authentication	MD5 digest authentication Multilevel Access Control

ENVIRONMENTAL SPECIFICATIONS (OPERATIONS AND STORAGE)

Environmental Parameter	Specification
Input Voltage	AC: 100 – 240 VAC Nominal, Auto-switching 50 – 60 Hz
AC Maximum Input Current	10 Amps @ 120 volts, 5 Amps @ 240 volts
AC Input Voltage Range (Nominal)	100-127 VAC and 200-240 VAC
Output	300 W-AC: +5V/20A, +12V/24A, -12V/0.6A, +3.3V/20A, +5VSB/3A
Operating Environment Conditions	Temperature: 5 C to 40 C Humidity: 5% to 85% RH non-condensing Altitude: 60 meters below sea level to 1800 meters above sea level
Storage	Temperature: -40 C to 70 C
Cooling System	Internal forced convection



Voice Unified Communications Business Productivity Solutions Midmarket Solution Provider

