NetPerformer®
System Reference

Overview

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Contents

List of Tables

List of Figures

Product Overview

1.1   Introduction

The NetPerformer family of Multi-service Integrated Access Devices integrates traffic over a variety of enterprise network infrastructures. The NetPerformer is both flexible and scalable:

- Interface cards provide more serial, analog and digital connections
- Firmware options to enhance the base feature set
- Interoperates with other network nodes in a variety of packetized environments.

The NetPerformer family of Integrated Access Routers is the optimal voice/data backhaul convergence solution. It has been designed for enterprises and carrier to integrate traffic over a variety of popular WAN infrastructures. It can be used over Switched/Lease Lines, Frame Relay backbones, satellite networks as well as IP backbone. Line costs are reduced by bundling various boundaries of traffic onto a single network infrastructure, replacing distinct voice, legacy data, SNA and LAN networks.

Additionally with the SkyPerformer software option, NetPerformer can be used to create point-to-multipoint networks, either full-satellite or hybrid terrestrial-satellite, transporting voice and data over satellite, perfect for linking remote sites in which terrestrial services are not readily available.

To further increase the performance over satellite, the SDM-9220/9230 TCP Acceleration option is also available to overcome the throughput limitation inherent with high latency links.

The NetPerformer does not only support voice over Packet Networks, but also includes excellent LAN, SNA and legacy data support. Models are available for branch, regional, corporate offices and central sites.

Key NetPerformer features include:

- Flexible WAN interface can use Switched/Lease Lines, Frame Relay, and IP.
- Power Cell Technology delivering Quality of Service with fine granularity over various WAN interfaces
- Efficient telephony transport and switching (voice, fax (G3, Super G3, G4, T.38), and modem (V.32bis or passthrough)
- Voice Traffic Routing™ with dialed digit manipulations and Any-to-Any Telephony connectivity
- Convergence and Compression for data and voice over various WAN including IP
- Choice of voice signaling-PowerCell encapsulation for bandwidth efficiency, or standard based VoIP with SIP signaling
- Radius Authentication and Billing
- IP RIP V1/V2/OSPF and IPX routing and bridging
- Level 2 and 3 QoS mapping using IP Precedence/TOS bits and 802.1 p/q prioritization
- 802.1 p/q VLAN support

- IP Multicast and NAT, including SIP NAT
- TCP Acceleration (option)
- Transparent Nx64K digital support over PowerCell, including PowerCell over IP
- Legacy and transparent data over PowerCell
- SS7 transport and MTP2 and /or FISU spoofing
- SDLC and LLC2 spoofing and conversion
- SNMP standard network management
- Web Server Interface
- Link Delay Compensation (option)
- IP Header Compression (option)
- VHF over IP

1.2   Hardware Platforms

All NetPerformer products and licensed software options (V10.1.0 and higher) run on the following hardware platforms:

- The SDM-9220/9230 standalone chassis model for branch, regional and remote offices. Refer to the *NetPerformer SDM-9220/9230 Hardware Installation Guide* for details.

- The SDM-8400 standalone chassis model, a data-only integrated access unit that supports multiple serial ports and Ethernet for increased serial port capacity. Refer to the *NetPerformer SDM-8400 Hardware Installation Guide* for details.

These NetPerformer hardware platforms employ the following standard and proprietary technologies:

- **Standard:** IP/Ethernet circuits, IP RIP v1/v2, IP Multicast PIMDM, VoIP using SIP (with NetPerformer SIP VoIP option), OSPF v2, PPP links, Frame Relay RFC-1490, SNA (SDLC, LLC and BAN/BNN) and VLAN IEEE 802.1 Q-1998.

- **Proprietary:** Memotec's Signaling Engine technology for full support of standard voice algorithms and both standard and proprietary data protocols, PowerCell connections to converge voice and data, Voice over PowerCell (with NetPerformer base product), Frame Relay-based satellite connections (with SkyPerformer option).

1.2.1   Chassis Comparison

	SDM-8400	SDM-9120	SDM-9220	SDM-9230
Base Unit Configuration (i.e.: without any I/O cards)				
Universal AC Power	Y	Y	Y	Y
-48 VDC	N	N	Y	Y
LAN Ports	1	2	2	2
Base Unit Serial Ports	4 & 8	1	1	1
DSP Sockets	-	1	1	1
Expansion Slots	-	2	2	3
Total Support				
LAN Ports	1	2	2	2
Serial Ports	4 & 8	3	3	3
T1/E1 Ports	-	4	4 (data only)	6

Table 1-1 Chassis Comparison

	SDM-8400	SDM-9120	SDM-9220	SDM-9230
BRI S/T physical ports	-	-	4	6
Logical Digital Data Ports	-	124	124	124
Digital Voice Ports	-	60	8 (BRI only)	120
Analog Voice Ports	-	8	8	12
FXO	-	8	8	12
FXS	-	8	8	12
E&M	-	8	8	12
BRI Voice Channels	-	-	8	12
CAS/PRI Voice Channels	-	60	N	120

Table 1-1 Chassis Comparison

- The SDM-9220GW and SDM-9230GW has the same serial port capacity as the SDM-9220 and SDM-9230 base units but do not support the same set of features. Refer to "SDM-9XX0 Model Feature Characteristics" on page 1-6 for more details.

- The voice capacity of the SDM-9230 and SDM-9230GW is 120 channels in PowerCell voice or VoIP SIP; it does require the SDM-92X0 dual port T1/E1 in order to have 4 to 6 digital spans in the 3 available slots.

1.2.2   SDM-9220/9230 vs. SDM-9220GW/9230GW

NOTE: The SDM-9220GW/9230GW models are no longer supported. This section exists for legacy information purposes only.

The SDM-92X0 products can be equipped with various modules and interface cards in order to meet your specific applications: type of interface and level of convergence, DSP density, required interfaces.

Table 1-2 will help you to decide which SDM-92X0 model is best suited based on the required features.

NOTE: Serial port expansion uses one of the expansion slots. The maximum capacity indicated for other interface types in the table is for a single interface type. When different types of interfaces are used, the number of expansion slots available on the base unit will dictate the limit.

BRI S/T can be used to support backup using PPP or PowerCell, or even fractional E interface when connecting to PSTN with ISDN signaling.

PowerCell license is a pre-requisite to SkyPerformer option on SDM-9220GW and SDM-9230GW. It is also required on the SDM-92X0GW when used to transparently transport EI voice interfaces and to spoof SS7.

Transparent digital is used to transmit Nx64Kbps timeslots over the WAN, independently of the protocol and using a Constant Bit Rate mode. When using Bit Oriented Protocol such as HDLC, the amount of bandwidth used on the WAN will vary based on the real traffic that needs to be transmitted on the WAN.

Feature	SDM-9220	SDM-9120	SDM-9220GW	SDM-9230GW	SDM-9230
Serial Port (base)	1	1	1	1	1
Maximum Speed	6/2 Mbps RX/TX	6/6 Mbps RX/TX	6/2 Mbps RX/TX	6/6 Mbps RX/TX	6/6 Mbps RX/TX
Serial Port Expansion	2	2	2	2	2
Ethernet Port	2	2	2	2	2
Expansion Slots	2	2	2	3	3
T1/E1 Interface	4	4	4	6	6
BRI S/T Ports	4	N/A	4	6	6
Analog Voice Ports	8	8	8	12	12
DSP Capacity	30	60	30	120	120
BRI voice capacity	8	N/A	8	12	12
T1/E1 voice capacity	N/A	60	30	120	120
Digital Voice Support	N/A	60 channels	30 channels	120 channels	120 channels
WAN Support IP, PPP, RFC1490	Yes	Yes	Yes	Yes	Yes
WAN PowerCell	Yes	Yes	PowerCell Opt.	PowerCell Opt.	Yes
PowerCell Voice/Fax	Yes	Yes	PowerCell Opt.	PowerCell Opt.	Yes
SkyPerformer Option	Yes	Yes	PowerCell Opt.	PowerCell Opt.	Yes

Table 1-2 SDM-9XX0 Model Feature Characteristics

Feature	SDM-9220	SDM-9120	SDM-9220GW	SDM-9230GW	SDM-9230
Legacy Data (Serial or Digital)	Yes	Yes	PowerCell Opt.	PowerCell Opt.	Yes
Transparent Digital	Yes	Yes	PowerCell Opt.	PowerCell Opt.	Yes
SS7 Spoofing	Yes	Yes	PowerCell Opt.	PowerCell Opt.	Yes
Link Redundancy	Yes	Yes	64K PPP backup or PowerCell opt.	64K PPP backup or PowerCell opt.	Yes
1:1 Hardware Redundancy	Yes	Yes	Yes	Yes	Yes

Table 1-2 SDM-9XX0 Model Feature Characteristics

1.2.3   SDM-8400 Description

The NetPerformer SDM-8400 enables incremental scalability of existing NetPerformer multifunctional routers by adding serial port capacity. It can also be used as a standalone unit for data only applications.

Figure 1-1:   NetPerformer SDM-8400 Unit

System Details   All base units come equipped with universal AC power supply, RJ-45-DB9F console cable, 19 inch rack mount kit and a 120 VAC North American or 240 VAC European power cord that must be specified at time of ordering. All data ports equipped with HD-26 female connectors. Adapter cables are required for serial ports and must be ordered as a separate item.

Interfaces
- One 10/100Base-T Ethernet (RJ45 connector)
- Four or eight serial ports (HD26 female connectors)

1.2.4   SDM-9220 Description

The NetPerformer SDM-9220 is an entry-level standalone chassis designed for flexible convergence at the branch office level. It is a high speed, low cost flexible and powerful unit that supports 8 analog or BRI/ST digital voice in a multitude of application scenarios.

Figure 1-2:   Front View of the SDM-9220 Unit

System Details   The SDM-9220 base unit is equipped with one serial port equipped with HD-26 female connector, two 10/100Base-T Ethernet (RJ45 connectors), one console port and two expansion slots. All UAC base units come equipped with universal AC power supply and a choice of 120 VAC North American or 240 VAC European power cord that must be specified at time of ordering. The –48VDC version include a 6 feet wiring harness. DB9F-DB9F console cable and 19-inch rackmount kit are also included. Adapter cable is required for serial port and must be ordered as a separate item.

Optional Interfaces

- One DSP connector per unit (DSP-160 type module only)
- Two expansion slots for the interface cards
- Analog voice interface cards: 2 and 4 ports FXS, 2 and 4 ports FXO, 4 ports E&M
- Digital voice/data interface cards: 2 ports BRI S/T, single port T1, single port E1 75 or 120 ohms, dual port T1/E1 (adapter cable required for E1-75 applications)
- BRI digital voice is supported on SDM-9220, but not T1/E1 voice
- Dual serial port interface card, maximum one card per unit, providing a maximum of three serial ports.

1.2.5   SDM-9230 Description

The NetPerformer SDM-9230 is a standalone chassis designed for flexible convergence at the branch office level.

It is a scalable product for branch offices that require support for 12 analog or 120 digital telephony channels.

Figure 1-3:   Front View of the SDM-9230 Unit

System Details   The SDM-9230 base unit is equipped with one serial port equipped with HD-26 female connector, two 10/100Base-T Ethernet (RJ45 connectors), one console port and three expansion slots. All UAC base units come equipped with universal AC power supply and a choice of 120 VAC North American or 240 VAC European power cord that must be specified at time of ordering. The –48VDC version include a 6 feet wiring harness. DB9F-DB9F console cable and 19-inch rackmount kit are also included. Adapter cable is required for serial port and must be ordered as a separate item.

Optional Interfaces

- One DSP connector per unit (DSP-160 type or High Density DSP module)
- Three expansion slots for the interface cards
- Analog voice interface cards: 2 and 4 ports FXS, 2 and 4 ports FXO, 4 ports E&M
- Digital voice/data interface cards: 2 ports BRI S/T, single port T1, single port E1 75 or 120 ohms, dual port T1/E1 (adapter cable required for E1-75 applications)
- Dual serial port interface card, maximum one card per unit, providing a maximum of three serial ports.

1.2.6   SDM-9120 Description

The NetPerformer SDM-9120 is a standalone 1U chassis designed for flexible convergence at the branch office level.

It is a scalable product for branch offices that require support for 8 analog or 60 digital telephony channels.

Figure 1-4:   Front View of the SDM-9120 Unit

System Details   The SDM-9120 base unit is equipped with one serial port equipped with HD-26 female connector, two 10/100Base-T Ethernet (RJ45 connectors), one console port and two expansion slots. All UAC base units come equipped with universal AC power supply and a choice of 120 VAC North American or 240 VAC European power cord that must be specified at time of ordering. The –48VDC version includes a 6 feet wiring harness. DB9FDB9F console cable and 19-inch rackmount kit are also included. Adapter cable is required for serial port and must be ordered as a separate item.

Optional Interfaces
- One DSP connector per unit (DSP-160 type or High Density DSP module)
- Two expansion slots for the interface cards
- Analog voice interface cards: 2 and 4 ports FXS, 2 and 4 ports FXO, 4 ports E&M
- Digital voice/data interface cards: Single port T1, single port E1 75 or 120 ohms, dual port T1/E1 (adapter cable required for E1-75 applications)
- Single serial port interface card.

1.2.7   SDM-9220GW and SDM-9230GW Description

> **NOTE:** These models are no longer supported. This section exists for legacy information purposes only.

The NetPerformer SDM-9220GW and SDM-9230GW are a standalone IP router and VoIP SIP gateways designed for flexible convergence at the branch office level. They are scalable products for branch offices that require support up to 120 VoIP digital telephony channels.

System Details   The SDM-9220GW and SDM-9230GW base units are equipped with one serial port equipped with HD-26 female connector, two 10/100Base-T Ethernet (RJ45 connectors) and one console port. The SDM-9220GW has two expansion slots and support up to 30 digital voice channels. The SDM-9230GW has three expansion slots and support up to

120 digital voice channels. The SDM-92X0GW base units support the same interface cards used for the SDM-9220 and SDM-9230 described in the previous pages; digital and analog voice are supported in the same unit. All GW base units come equipped with a DSP module supporting up to the specified number of voice channels.

All UAC base units come equipped with universal AC power supply and a choice of 120 VAC North American or 240 VAC European power cord that must be specified at time of ordering. The –48VDC version include a 6 feet wiring harness. DB9F-DB9F console cable and 19-inch rackmount kit are also included. Adapter cable is required for serial port and must be ordered as a separate item.

The basic software set provide support for VoIP SIP and IP routing over Ethernet, serial or digital ports using PPP or Frame Relay RFC-1490. PowerCell license is available for the SDM-9220GW/9230GW only, enabling support for PowerCell Voice and Data, including support for legacy user data. SkyPerformer and TCP Acceleration can also be added on top of the PowerCell license.

1.3 Firmware and Options

The NetPerformer base product firmware offers multi-protocol transport over various WAN infrastructures using PowerCell™, a proprietary cell-based protocol that ensures Quality of Service and minimum delays. Several licensed software options can be installed on the base product:

- **NetPerformer Voice over IP (VoIP) Option:** Provides a distributed voice communications system that can be integrated with a worldwide VoIP softswitch platform, offering voice transport over IP using standard Session Initiation Protocol (SIP). Refer to the *Voice over IP (VoIP) Option* module of this document series.

- **SkyPerformer Option:** Provides satellite access functionality to the NetPerformer product, creating a hybrid terrestrial/satellite network that uses a single hardware platform and network management system. Refer to the *SkyPerformer Option* module of this document series.

- **TCP Acceleration Option:** Permits higher performance on satellite links, extending the feasibility of the TCP/IP protocol to satellite applications. Offered on the SDM-9220 and SDM-9230 only. Refer to the *TCP Acceleration Option* module of this document series.

- **IP Header Compression Option:** Provides the ability for the NetPerformer unit to compress, on a hop-by-hop basis, multiple IP headers including IPv4, TCP, UDP and UDP/RTP headers.

- **Link Delay Compensation (LDC) Option:** Provides the ability for the NetPerformer to compensate for delay between satellite and terrestrial links. This feature can be utilized on PowerCell links and will work by adding compensation delay to terrestrial links when detecting the activation or presence of a satellite link in the network. This capability is required, for example, in Air Traffic Control networks where transmission of VHF audio should be synchronized with all locations.

The procedure for installing these options is provided in the *Software Installation and Licensing* module of this document series.

1.3.1 Software Options

Each base unit ordered includes the basic NetPerformer software. Some features require the purchase of an optional license.

A software license is required to enable Voice over IP with SIP signaling on the SDM-9220/9230; this is now done via a configuration parameter. SIP is the only voice transport method available on the SDM-9220GW/9230GW.

SkyPerformer and TCP Acceleration options can be added on the NetPerformer SIP enabled units.

The VoIP SIP feature of the NetPerformer provides support for standard based Voice, FAX, and modem over IP using SIP signaling. This allows interconnection of NetPerformer to other SIP standard based devices using Service Providers for enhanced connectivity. The NetPerformer with SIP interoperates with the Clarent Class 5 Call Manager, and

Clarent Command Center, other SIP proxies and SIP phones, as well as a standalone proxyless SIP, using integral ingress and egress dialing plans.

For the SDM-9220/9230 products, TCP/IP acceleration software licenses can be used to accelerate TCP/IP traffic (typically file transfer and web browsing) over links with long delay like, for example satellite links. TCP/IP acceleration licenses are available in two options. The first license type supports up to 100 TCP connections, which is suitable for branch locations. The second license type supports up to 300 TCP connections, which is more suitable for regional and central site locations. The license is specific to SDM-9220 or SDM-9230 and requires the serial number of the units. Upgrade of existing units in the field is possible.

The SDM-9220GW and SDM-9230GW provide VoIP SIP gateway functionality and include integral IP router with WAN connectivity using serial/digital (Frame Relay RFC1490, PPP) or Ethernet port.

PowerCell option is available for the SDM-9220GW and SDM-9230GW if support for legacy data is required, or if PowerCell WAN is preferable for greater WAN efficiency. The PowerCell license also allows the GW unit to be configured for more bandwidth efficient PowerCell voice transport over nay type of network including IP.

PowerCell license is specific to SDM-9220 or SDM-9230 ands requires the serial number of the units. Upgrade of existing units in the field is possible.

All NetPerformer chassis can be used to create satellite-based networks (either full satellite or hybrid terrestrial/satellite) with the SkyPerformer's software option. SkyPerformer enables the transport of packetized and compressed voice and data over satellite, which is perfect for linking remote sites in which terrestrial services are not available. SkyPerformer can also be deactivated when terrestrial services become available. The license is available for any type of NetPerformer base unit.

1.4   Scalability and Flexibility

The NetPerformer's scalable hardware and firmware design provides an easy migration path for changing network needs.

- Provides telephony interfaces in densities appropriate to small remote offices or large headquarters
- 2 to 120 telephony channels per unit
- PBX and PSTN voice interfaces include analog FXS, FXO and E&M, digital T1, E1, ISDN-PRI, ISDN-BRI, and support of switched QSIG supplementary services
- Converges voice and data over leased or switched lines, Frame Relay, PPP links, ISDN PRI and BRI, satellite, IP/Ethernet circuits
- Software configurable voice compression topography, enhanced voice mapping table and adjustable voice traffic buffers.

2

NetPerformer Features

2.1   About the NetPerformer Features

The NetPerformer converges voice and data, and provides:

- Multi-service support for the enterprise network
- Quality of Service (QoS) prioritization, voice quality and reliable data delivery
- Instant connectivity to PBX, key system and data networks
- Integrated PowerCell routing of an array of traffic types
- Simplified management and increased transport choices.

2.2   Convergence of Multiple Traffic Types

The NetPerformer integrates traffic from various sources and outputs it to one or more network types:

- With T1 or E1 channelized digital connections, each of the embedded DS0s contains voice, fax or modem signals in the form of pulse coded modulation (PCM).
- The NetPerformer also supports analog voice, data (including legacy protocols), LAN and IP/IPX traffic.
- Voice traffic is internally routed to a DSP resource, which compresses each voice channel using a preconfigured algorithm: ACELP-CN, G.723, G.723.1, G.726 (16 to 40K), G.729 (available only with SIP license enabled on the unit), or PCM64K.
- Fax and modem signals are also demodulated and converted into a data stream.
- Various signaling schemes (CAS, MF, DTMF, etc.) are used to determine the destination of each call.
- Each call is routed to its destination over IP, Frame Relay, PowerCell or satellite connections.
  - Both the NetPerformer base product and NetPerformer SIP VoIP transport data over PowerCell
  - NetPerformer base product transports voice directly over PowerCell
  - NetPerformer SIP VoIP does voice over IP, which can be subsequently transmitted over PowerCell (requires another NetPerformer SIP VoIP at the other end) or standard PPP and Ethernet protocols
  - Physical interfaces for routing data traffic include channelized T1/E1, serial WAN/user and Ethernet LAN interfaces.
- Digital signaling is converted as required in order to maintain compatibility with various types of remote units.
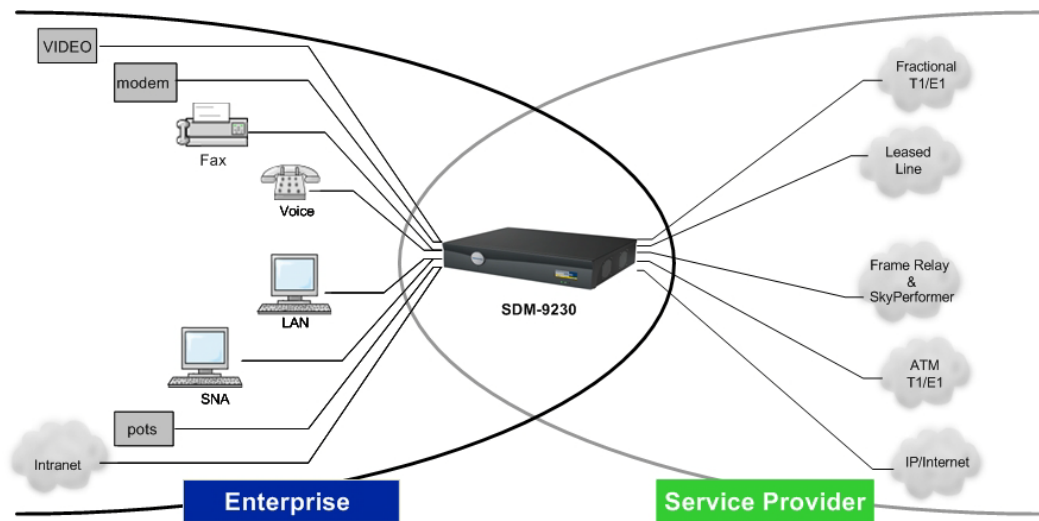
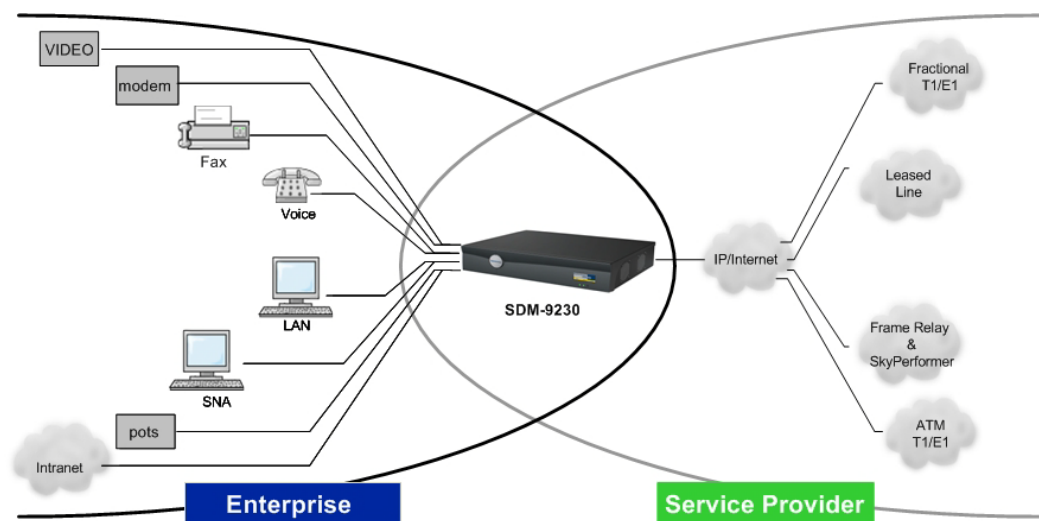*Figure 2-1:   The NetPerformer as Convergence Manager using PowerCell*

Figure 2-2:   The NetPerformer as Convergence Manager over IP

2.3   Multi-service Feature Set

- Integrates Internet, Frame Relay, SNA, legacy data, HDLC/ASYNC, IP LAN traffic (including VLAN), toll-quality analog and digital voice/fax/modem transmissions over a single communication circuit, eliminating parallel voice and data networks

- Transmits and receives traffic over IP, public or private Frame Relay, leased line networks or satellite

- Integrates RIP V1/V2 IP, IPX and OSPF networks with central-point routing and bridging, including IP Multicast, IP Subnet Broadcasting, and PowerCell over IP

- Provides multi-channel support for simultaneous voice and data streams through an optional digital T1, E1 or ISDN-BRI S/T interface

- PowerCell technology permits concurrent handling of a variety of traffic types and configurable prioritization of SNA, legacy data, LAN and WAN (PVCR) traffic

- Supports a broad range of voice signaling types: analog FXS, FXO and E&M, digital Channel Associated Signaling (CAS), Common Channel Signaling (CCS), QSIG, ISDN-PRI and ISDN-BRI S/T

- Provides a variety of voice algorithms in a configurable, modular DSP allocation scheme: ACELP-CN, G723.1 (low and high), G726 (from 16K to 40K), G729, G729A and PCM64K

- On the NetPerformer base product, allows for T1 and E1 transparent signaling between 2 PBXs that use CCS, over timeslot 24 (on a T1 connection) or 16 (on an E1 connection)

- Permits customization of digital line signaling characteristics for non-standard applications

- Supports analog PBX connections using E&M interface cards, allowing for up to 16 E&M lines and a variety of signaling types: Immediate Start, Wink Start, Timed E, as well as customized signaling

- Includes CAS emulation of FXO, FXS, Grounded FXO, Grounded FXS, E&M Immediate Start, E&M Wink Start, R2, PLAR

- Offers a Drop and Insert functionality (Passthrough mode) on digital interfaces, useful for dividing timeslots between compressed voice traffic that passes through PowerCell over IP, and uncompressed traffic that is routed directly to the PSTN

- Provides Network Address Translation (NAT) support to prevent IP address depletion and ensure efficient service in Internet applications

- Replaces SNA leased lines with a single Frame Relay connection supporting multiple PVCs and, for voice traffic, SVCs

- Provides fax/modem relay between 2 NetPerformer nodes (NetPerformer base product only)

- NetPerformer SIP VoIP provides standard VoIP support using SIP call setup, RTP (Real-Time Protocol) for voice transport and T.38 for fax

- Adds provision for line failure with virtual connections and dial backup functions

- Optimizes bandwidth utilization with traffic prioritization, Bandwidth-On-Demand and load balancing

- Minimizes delays for time-sensitive applications with Weight Fair Queueing (WFQ) prioritization schemes over multiple traffic types

- Ensures standards-compliant interoperability with RFC-1490, SIP (on NetPerformer SIP VoIP) and Simple Network Management Protocol (SNMP)

- Facilitates firmware upgrades through FTP download, ZMODEM transfer via the console and proprietary access tools

- Provides traffic capture capabilities for troubleshooting purposes

- Includes management capabilities such as SNMP support, Telnet remote access and direct or dial-up console connection.

2.4 Traffic Handling

- Switching through intermediate NetPerformers using PowerCell technology
- PVC bundling to concentrate Frame Relay traffic originating from multiple FRADs
- Virtual LAN (VLAN) functionality to logically group nodes on different LAN segments and prioritize their traffic
- SVCs and Hunt Groups to maximize voice switching capacity (on NetPerformer base product only)
- Voice Traffic Routing (VTR) for local control of how voice traffic is forwarded to its intended destination, with the possibility of setting up alternate routes using local and long distance services
- Bandwidth On Demand over leased lines for managing bursty LAN traffic
- Load balancing over leased lines or Frame Relay for high-speed support using multiple circuits
- Dial backup
- Multi-protocol support with prioritization through class of service queues
- SNA host port reduction
- Administrative filtering to reduce the internetwork load, based on protocols, source/destination addresses and user-defined patterns
- PPP and BOOTP/DHCP Relay support.

2.5   PowerCell Technology

PowerCell is a cell-based protocol that conserves network bandwidth, ensures Quality of Service and reduces delays. It provides:

- Voice and data transport over various WAN infrastructures, including IP and IP/Ethernet circuits

- Prioritization and compression technology for superior network performance. A PowerCell solution provides the advantages of data compression, multi-protocol encapsulation and Quality of Service using 8 classes of service.

- PowerCell runs over IP, Frame Relay, leased lines, PSTN, and satellite. Protocol switching, e.g. from IP to Frame Relay, is accomplished without IP transport overhead when switching onto the Frame Relay network.

- PowerCell switching allows for the creation of a private enterprise network that uses virtual connections between different network nodes. No direct links are required between the remote locations, since PowerCell can switch traffic via the central site unit.

- Voice switching using PowerCell permits defining all call routes within the unit using Voice Mapping Tables. Since no softswitch is required, this is an effective low-cost solution for the small to medium-sized enterprise.

- Through PowerCell, the NetPerformer discovery capability is extended to all other nodes in the network. Auto-discovery of nodes and routes is achieved when the PVCR protocol is active on the WAN.

- PowerCell QoS can be combined with IP Precedence TOS bit and 802.1p/q support to provide end-to-end Quality of Service for voice and mission-critical data applications.
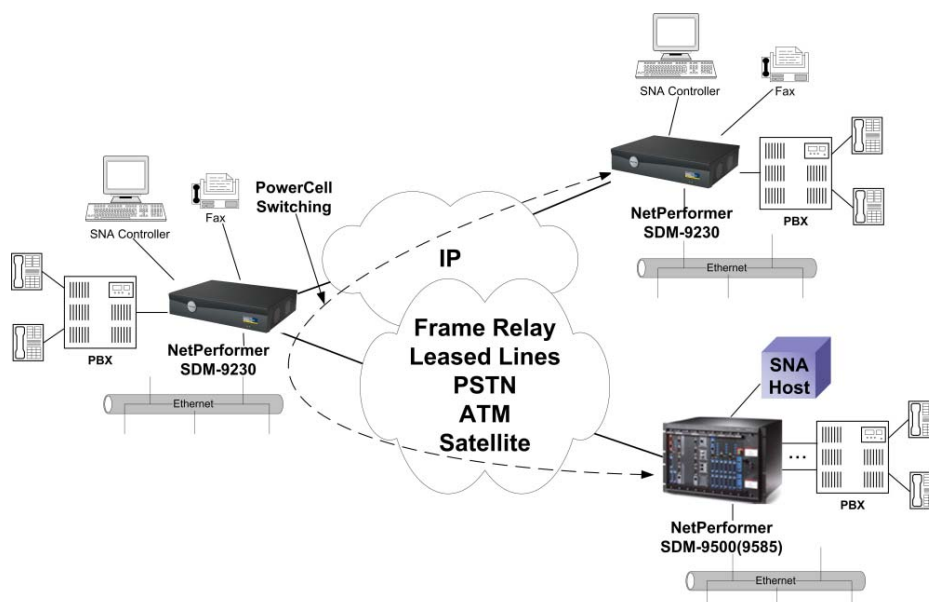

Figure 2-3:   NetPerformer PowerCell Service Scenario

The NetPerformer base product can be used to build a private network for enterprises of all sizes through virtual connections between different network nodes (IP, Frame Relay, etc.) using PowerCell switching.

- To establish these connections, no direct links are required between the remote locations, since PowerCell can switch traffic via the central site unit.

- PowerCell runs over IP, Frame Relay, leased lines, PSTN, and satellite

- Protocol switching, e.g. from IP to Frame Relay, is accomplished without IP transport overhead when switching onto the Frame Relay network

- This solution provides the advantages of data compression, multi-protocol encapsulation and QoS using up to 8 classes of service

- Voice switching using PowerCell permits defining all call routes within the unit using Voice Mapping Tables

- No softswitch is required in this scenario, which results in a significant cost savings for the small to medium-sized enterprise.

3

NetPerformer Options

3.1   NetPerformer SIP VoIP Option

The NetPerformer SIP VoIP option is an IP-centric voice/data integration solution that employs Session Initiation Protocol (SIP). This protocol is based on existing Internet and SMTP/HTTP conventions that are well suited for large point-to-point and any-to-any networks.

The NetPerformer SIP VoIP option is intended for a broad range of applications and serves the wide area internetworking needs of central sites, regional offices and both large and small branch offices.

- Converges voice and data over PPP links, Frame Relay RFC-1490 and IP/Ethernet circuits
- Uses Memotec's Signaling Engine technology for SIP-based VoIP transport, standard voice algorithms and both standard and proprietary data protocols and data compression algorithms
- Provides T1/E1 connectivity, including digital connections to PBXs via T1 and E1 using CAS and CCS (QSIG), and offers drop and insert multiplexing for both data and voice
- Maximizes bandwidth usage with high throughput levels, low overhead and minimal delays, and guarantees reliable integration of voice, fax and data traffic.
- Optimizes line utilization with cell-based multi-protocol prioritization, Bandwidth-On-Demand and Load Balancing, and adds provision for line failure with Virtual Connections and dial backup functions
- Significantly reduces communications costs, since it cuts long distance charges, handles time-sensitive applications with reduced delays, and eliminates the need for dedicated voice and data circuits in the network
- Runs on the same hardware platform as the NetPerformer base product line, and includes most of the NetPerformer base product features.
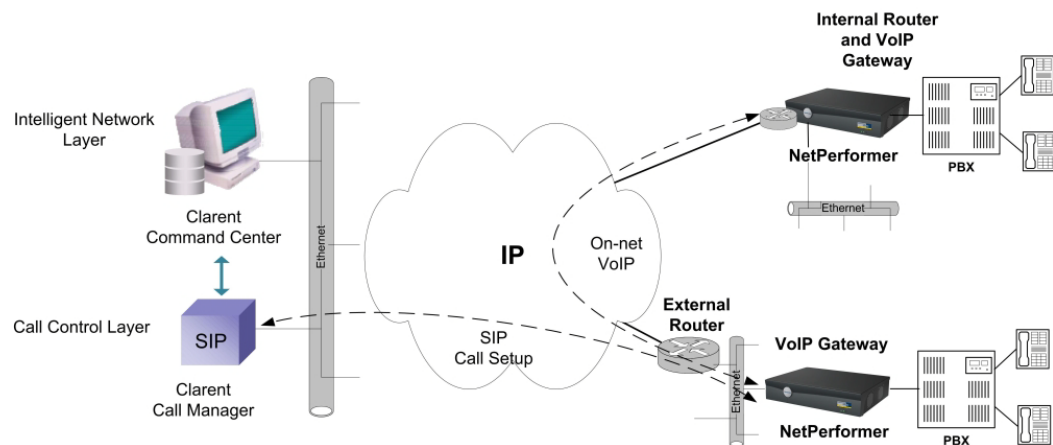

Figure 3-1:   NetPerformer SIP VoIP Service Scenario

The NetPerformer SIP VoIP option offers a full service scenario for the enterprise network that uses SIP transport. In this application, the NetPerformer provides seamless integration of Frame Relay, and PSTN networks under IP-centric control.

- Permits a unified voice/data routing service across the entire network using a standard IP protocol

- Allows interconnection of the NetPerformer with other SIP-based devices using Service Providers for enhanced connectivity

- Allows all areas of the network to benefit from the throughput and cost advantages of Voice over IP, including small branch offices in remote locations

- Provides QoS for voice connections and excellent response times across all locations

- Supports traffic types that otherwise could not be transmitted across the central data cloud, such as analog PBX, satellite and data transmissions

- Integrates these traffic types with digital voice and data using IP over WAN, Frame Relay, and IP trunking.

The NetPerformer VoIP SIP option can interoperate with the Clarent Class 5 Call Manager and Clarent Command Center, other SIP proxies and SIP phones, and support a standalone proxyless SIP application using an integral ingress and egress dialing plan.

- Provides all participating sites with the call management and control features of the IP-centric softswitch

- Allows the network to attain a global presence, with enhanced flexibility, scalability and compatibility with other gateways.
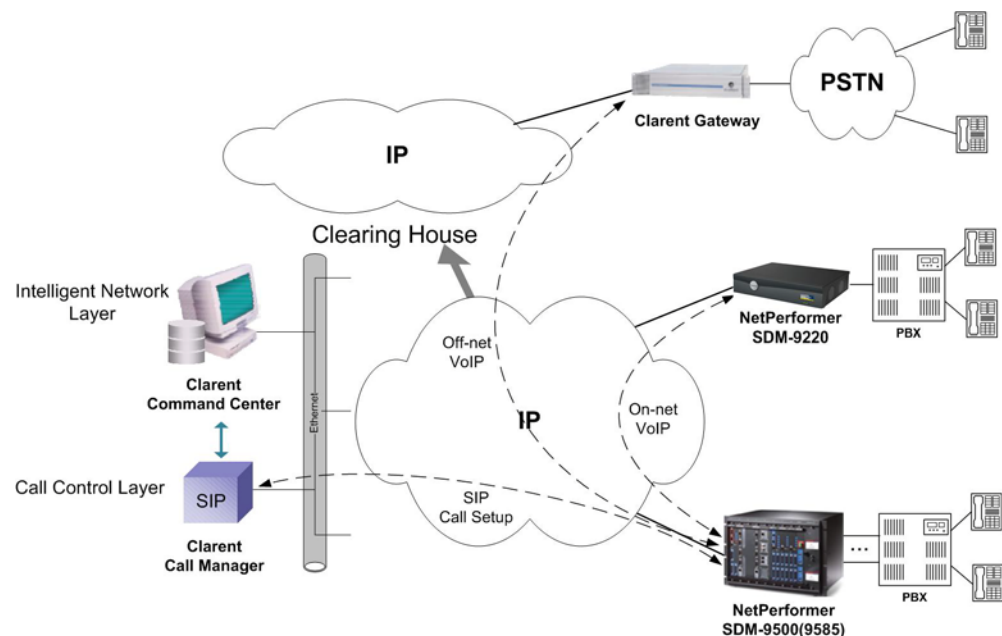
Figure 3-2:   NetPerformer SIP VoIP Option to Clarent Gateway

Further information on the SIP VoIP licensed software option can be found in the *Voice over IP (VoIP) Option* module of this document series.

3.2   SkyPerformer Option

Memotec SkyPerformer is a licensed software option that adds satellite access functionality to the NetPerformer product line.

- Creates a hybrid terrestrial/satellite network using a single hardware platform and network management system.
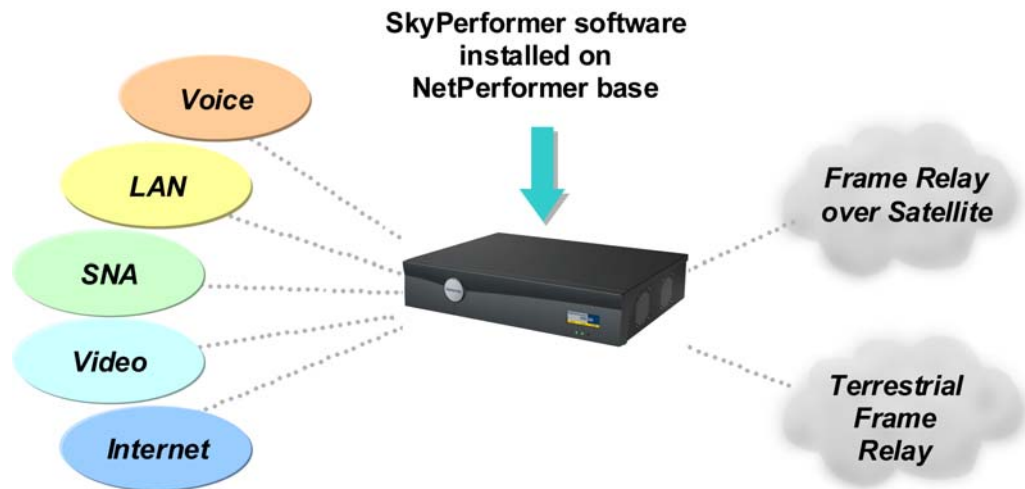- Exploits the broadcast nature of satellite communications.

Figure 3-3:   SkyPerformer Hybrid Network

The SkyPerformer software is based on Frame Relay standards and offers a scalable solution for both remote and central sites:

- Permits seamless communication with any Frame Relay compliant equipment such as FRADs, routers and switches
- Goes where terrestrial Frame Relay cannot, providing a cost-effective solution for small to medium sized satellite networks
- Consolidates voice, data and LAN traffic with terrestrial Frame Relay networks and equipment
- Offers a hubless VSAT solution that requires neither an expensive DAMA computer nor a central site switch (TDMA)
- Offers a superior solution to the point-to-point Single Channel Per Carrier (SCPC) approach, as it requires fewer satellite carriers, uses less hardware and may dispense with a central site PBX or host
- Provides better performance, with no double-hop satellite delay for voice/data traffic, and no double compression required for voice
- Supports a wide variety of satellite network topologies: single or distributed star, partially or fully meshed, point-to-point and multipoint networks
- Interfaces with all third-party satellite modems

    Note: The SkyPerformer network solution requires external third-party satellite modems that operate up to 6 Mbps or 2 Mbps, depending on the application.

Further information on the SkyPerformer licensed software option can be found in the *SkyPerformer Option* module of this document series.

3.3   TCP Acceleration Option

The NetPerformer TCP Acceleration Option permits higher performance on satellite links, extending the feasibility of the TCP/IP protocol to satellite applications. It is offered on the SDM-9220 and SDM-9230 as a licensed software option in NetPerformer version 10.2.x and above. The NetPerformer TCP Acceleration Option handles the obvious problems associated with using TCP/IP, a protocol that was optimized to run on terrestrial networks, in a satellite environment:

- **Link latency:** A satellite network is necessarily comprised of high-delay products, and satellite link bandwidth is not efficiently utilized

- **High error rate:** The potentially higher bit error rate of a satellite results in poor TCP/IP performance

- **Asymmetry:** Satellite links often operate in an asymmetric mode where they receive at a higher data rate than they transmit. The low-rate uplink easily becomes congested.
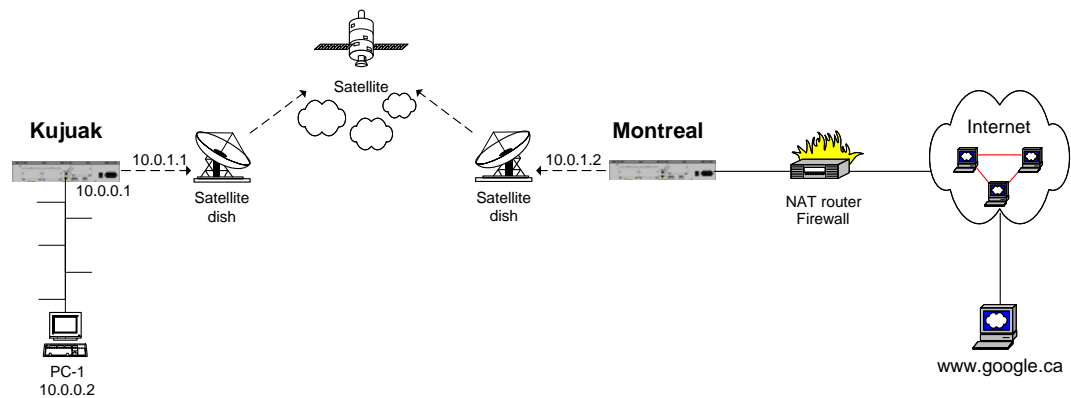
Figure 3-4:   TCP Acceleration Scenario

The TCP Acceleration Option is installed on all NetPerformer units that act as a gateway to the satellite network with a **MODULATOR** satellite connection. The NetPerformer unit may be installed in front of a satellite modem or another router.

To improve TCP/IP performance over satellite links, the NetPerformer solution addresses transparency requirements, backward compatibility, improved network efficiency and scalability, and permits high transmission rates. The protocol enhancement method used has no negative impact on performance or connections, and can work with existing Internet and intranet infrastructures. TCP connections are automatically spoofed if they are sent or received at a connection where TCP Acceleration is activated.

Further information on the TCP Acceleration licensed software option can be found in the *TCP Acceleration Option* module of this document series.

3.4   Link Delay Compensation

Information about the Link Delay Compensation licensed software option can be found in the *Link Delay Compensation (LDC)* module of this document series, located in the *System_Reference* folder on the *NetPerformer Documentation CD.*

3.5   VHF over IP

Information about the VHF over IP licensed software option can be found in the *VHF over IP* module of this document series, located in the *System_Reference* folder on the *NetPerformer Documentation CD*.

Index

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