

Automatic Voice and Data Fail-over

Automatic Backup for T1/E1 Circuits over IP or Satellite



Product Highlights

- Automatically detects outage in the network and routes traffic over a back up link
- Utilizes advanced digital signal processing (DSP) voice compression —only 128 Kbps to fully back up a T1, 192 Kbps to fully backup an E1
- Drop and insert capability to groom or back up selected DSOs of T1/E1 circuits
- Automatic TDM Clock regeneration at remote locations
- VPN security

NSGDatacom

Automatic Backup for T1/E1 Circuits over IP or Satellite

While terrestrial networks are vulnerable to outages due to natural or man-made disaster at any time, implementing automated backup for full or fractional T1/E1 voice/data circuits is an expensive proposition for most operators. However, using new compression technology from Netrix, toll quality voice can now be maintained over low speed satellite, wireless, and IP networks. Field proven by the US Military and used by major carriers, low bandwidth voice compression is now a viable backup to standard telephone T1/E1 PSTN and cellular backhaul connections. TDM timing and data clock can be recovered across IP or other packet based connections, even when long delays such as multiple satellite or wireless hops are present.

The Netrix Network Exchange (Nx) 2200 product family from NSGDatacom offers operators a cost effective way to automatically monitor and backup critical T1/E1 voice/data circuits that may be subject to outage due to intermittent or catastrophic failure. In the event of failure, Nx2200 products automatically compress and route toll quality voice and data over an alternate network connections, and allow controlled redeployment to the primary link when it is re-established. This helps operators maintain customer service levels, and minimize potential revenue losses during unplanned network outages. More importantly, it can eliminate critical delays in re-establishing communications to an area suffering from hostile activity or natural disaster.



Operational Description

Multiple types of connections may be configured to backup a T1/E1 link. These include IP packet-based transmission, or point-to-point serial transmission over terrestrial, microwave, satellite or wireless. Configuration of Nx2200 series products is totally symmetrical in that any type of link may be configured to backup any other type of link. These products also support a full digital cross connect at the DS0 level, and data aggregation functions such that multiple voice and data circuits may be combined for transmission over backup and/or primary packet-based or TDM networks.

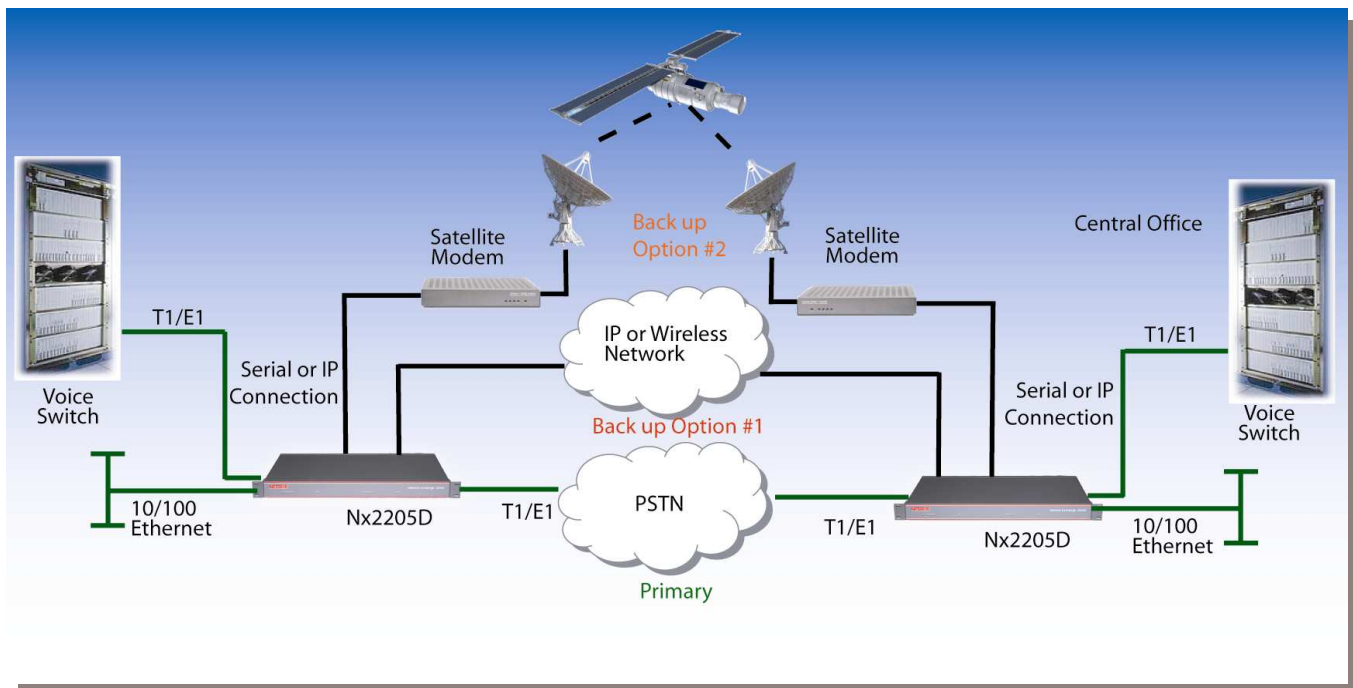
For conventional PSTN voice circuits, individual voice channels may be compressed using toll quality voice compression to substantially reduce bandwidth usage. For additional bandwidth savings, multiple calls are combined using our proprietary SFTM trunking protocol over IP or other packet-based links, such that the each voice call uses as low as 4.8Kbps of bandwidth while still maintaining toll quality voice fidelity. Optional silence suppression enables bandwidth to be reduced even further, to give 16:1 or greater total compression when there is nominally 50% silence. Comfort noise generated locally during periods of silence ensures users are not aware silence suppression is being used. Where bandwidth is not an issue, uncompressed T1 or E1 circuits may be transmitted over a packet connection with automated TDM clock recovery at the remote location where necessary.

For cellular backhaul and fractional T1/E1 circuits, unused DS0s are not transmitted, eliminating the need to reserve unnecessary bandwidth on high cost backup links. Data compression may be used to further compress fractional T1/E1 IP packet data.

Automatic Fail-over

A range of parameters may be monitored on a T1/E1 link with user defined thresholds for different conditions to trigger automated fail-over to one or more alternative connections. The link may be monitored for total loss of service, loss of path, or service degradation due to an increasing error rate or frame alarms.

Automatic Backup over Wireless or Satellite



The above diagram shows how the Nx2205D can provide automatic backup to the primary PSTN link using satellite, IP, or a wireless connection.

Depending on the reason for fail-over, and the type of traffic on the link, it may be possible for calls in progress to be gracefully moved from an existing link to a new link as they are cleared down. The Nx2200 series of products offer a sophisticated suite of network gateway functions for voice calls between different network types, such as Public Telephone Networks, Cellular and Voice over IP. In some cases during a complete network failure the Nx2200 series products can hold a call open at the endpoints and reconnect them over the backup link without customers even being aware that a catastrophic event has taken place.

Automatic Restoration

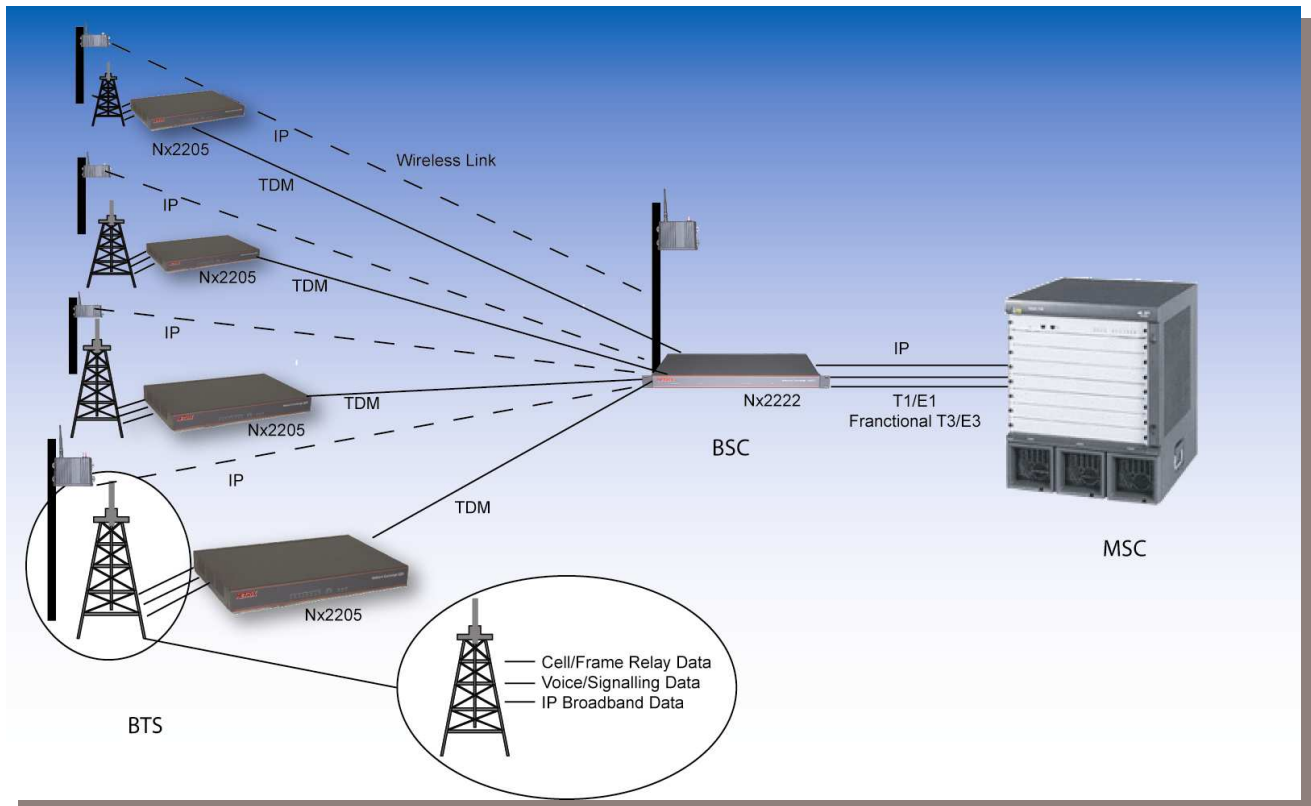
Traffic can be automatically routed back over a primary link when it recovers, based on preprogrammed criteria. Some circuits may have to be backed up for "brownout" rather than complete failure. Since this condition results in frequent short duration outages, brownouts could cause a circuit to "bounce" between the primary and backup path, which would in turn cause repeated dropping of calls in progress. Recovery can be placed under manual control with information on link stability and operational statistics accessible to the operator in real time using the NetrixView Network Management System. Depending on the type of circuits in use, calls in progress may be gracefully moved from one active circuit to another with minimal noticeable impact on users.

The Nx2200 series products can also be programmed to route across different network connections based on other criteria such as time of day, network loading, etc.

Award Winning Voice Compression

The Nx2200 products utilize advanced Digital Signal Processing (DSP) voice compression techniques, which greatly exceed standard VoIP compression methods. For example, SIP systems cannot easily be used for efficient backup due to the high overhead and relatively low level of overall compression achieved. However, the award winning Netrix compression algorithms, which retain PSTN quality voice, require only 5.5 Kbps of bandwidth per voice call before silence suppression is enabled. Signaling channel data may be packetized and combined with other data for additional bandwidth savings. Local acknowledgements also minimize traffic sent over the link when there is no call activity. These bandwidth requirements translate to a high cost saving for the redundant path, such that many organizations now consider permanently provisioned backup circuits also viable for overflow traffic at peak utilization in addition to the back up function.

Wireless Backup for Terrestrial Links



The above diagram shows terrestrial primary connections with wireless backup links using a single Nx2222 connecting multiple services at the BSC with Nx2205s, using the inherent digital TDM cross connect, IP routing, and aggregation functions of both products.

Fractional Backup

With fractional backup an operator can choose to protect only certain channels, or a certain number of channels within the T1/E1, thereby reducing the bandwidth required during backup. Nx2200 products allow a full or fractional T1 circuit to backup a full or fractional E1 circuit, or vice versa. Conversion between T1 and E1 is also possible through Nx2200 series products, with T1 clock generation possible from incoming packet based data, or from a terrestrial E1 circuit.

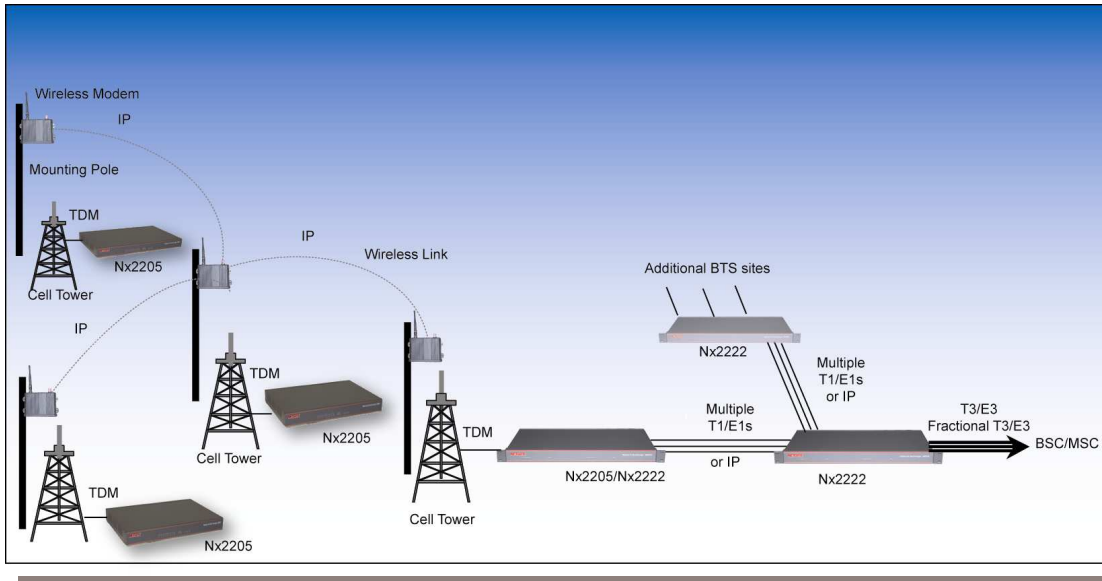
Activity Logging and Alarms

Comprehensive activity logging guarantees that operators can check the quality and usage of both primary and backup path for SLA certification. Extensive remote Configuration, Monitoring and Alarm functions are provided by the NetrixView NMS system, along with a comprehensive suite of other Management and Diagnostic tools.

TDM Clock Recovery

Nx2200 products employ deep plesiosynchronous buffer systems, T1/E1 jitter attenuation and clock recovery mechanisms with configurable options to fine tune for the delay over an IP link. Depending on the type of link and the reliability of service, buffer depth may be set to accommodate a wide range of delay and/or varying transmission profiles such as terrestrial IP, wireless IP, satellite networks, or a combination of all these with multiple hops.

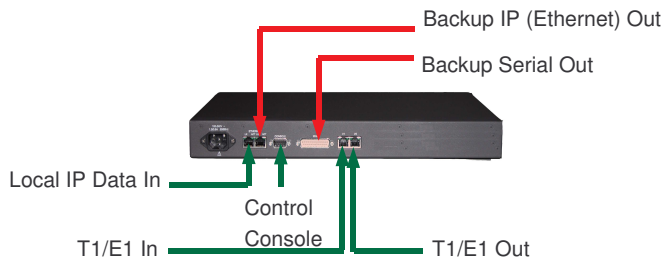
Support for Wireless Back up



The diagram above shows how Nx2200 series products can create as needed a wireless IP mesh connections between locations with TDM clock recovery at the BTS, even with multiple wireless hops.

Operation over Satellite

The Nx2200 products are optimized for use with Satellite networks and operate seamlessly with DAMA systems where bandwidth is available from a pool on an as-needed basis. With Nx2200 series products installed at both ends of a terrestrial T1/E1 link, the satellite bandwidth required during normal operation is minimal. In the event of a terrestrial link failure the voice/data traffic is compressed and rerouted via a dedicated serial or Ethernet connection over the satellite link. The DAMA system automatically detects the increase in traffic and additional bandwidth is allocated to the satellite connection for as long as needed. When the primary T1/E1 connection is re-established, traffic may be gracefully removed from the backup connection back on to the primary connection as calls are cleared.



The size and layout of the Nx2205D makes it easy to install and simple to connect into the network. The Nx2222 has similar ease of use, supporting up to 9 simultaneous T1/E1 through connections plus IP in a single 1 U high chassis.

Summary

The Nx200 products provide a proven, cost effective, and highly reliable solution for backing up your voice and/or data network, particularly suited to situations where there is a likelihood of intermittent or catastrophic failures in the network. The Nx2200 products are optimized for operation over satellite networks but are equally effective for backing up T1/E1 voice/data links over low speed terrestrial, wireless or microwave networks. VPN security is available for protecting sensitive communications.

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