

## The Cyclix N+™ Architecture: A Fault-Tolerant, High Transaction SIP Network

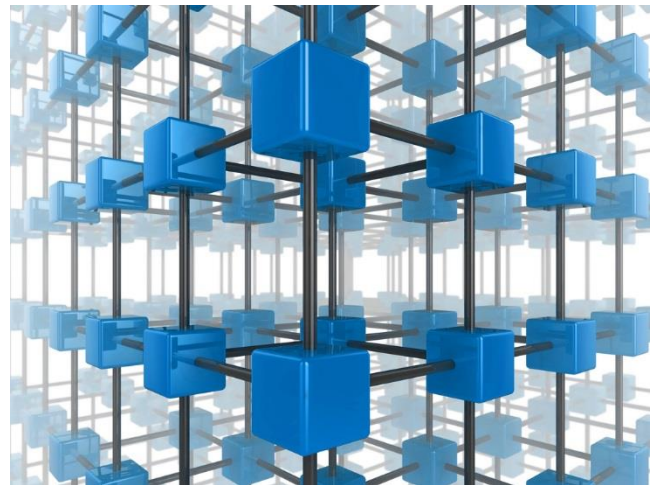
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### Synopsis

*VoIP (Voice over Internet Protocol) technology offers business users some wonderful new advantages over time-division multiplexing (TDM) switching architectures. One of those advantages is the ability to have a customer's premises equipment (CPE) be dynamically tied to a group of N SIP (Session Initiation Protocol) switches, and allow calls to be distributed in real time across that switch set.*

*Realizing such an architecture with N SIP switches offers redundancy and throughput advantages that are not possible with circuit-based technologies. The following report describes how Cyclix achieves this N+™ redundant architecture for its client base.*



### Today's SIP-Based VoIP

VoIP networks and services have grown beyond the point of curiosity. In fact, the technology is radically changing the telecommunications industry by surpassing legacy circuit-switched PSTN (public switched telephone network) networks, in volume, feature possibilities, and pricing economics.

As with any emerging technology, hurdles present themselves as the use of the technology evolves. With VoIP, a novel approach is now needed to overcome the issues relating to SIP throughput and redundancy—two areas that have become a significant issue.



Specifically, the problems that arise are:

- **Heavy Bandwidth Utilization**—SIP utilizes an abnormally high rate of bandwidth for signaling; i.e. ~15 kbs for each sustained single call per second, which is an astronomical amount of data to process for a given call load.
- **Character Clumsy**—SIP is somewhat difficult for computers to handle. The protocol is all text, which must be parsed using relatively compute-intensive text manipulation software.

As a result of these issues, today's fastest servers are being challenged when attempting to rival switching speeds of the SS7-ISUP (Integrated Services User Part) based TDM networks.

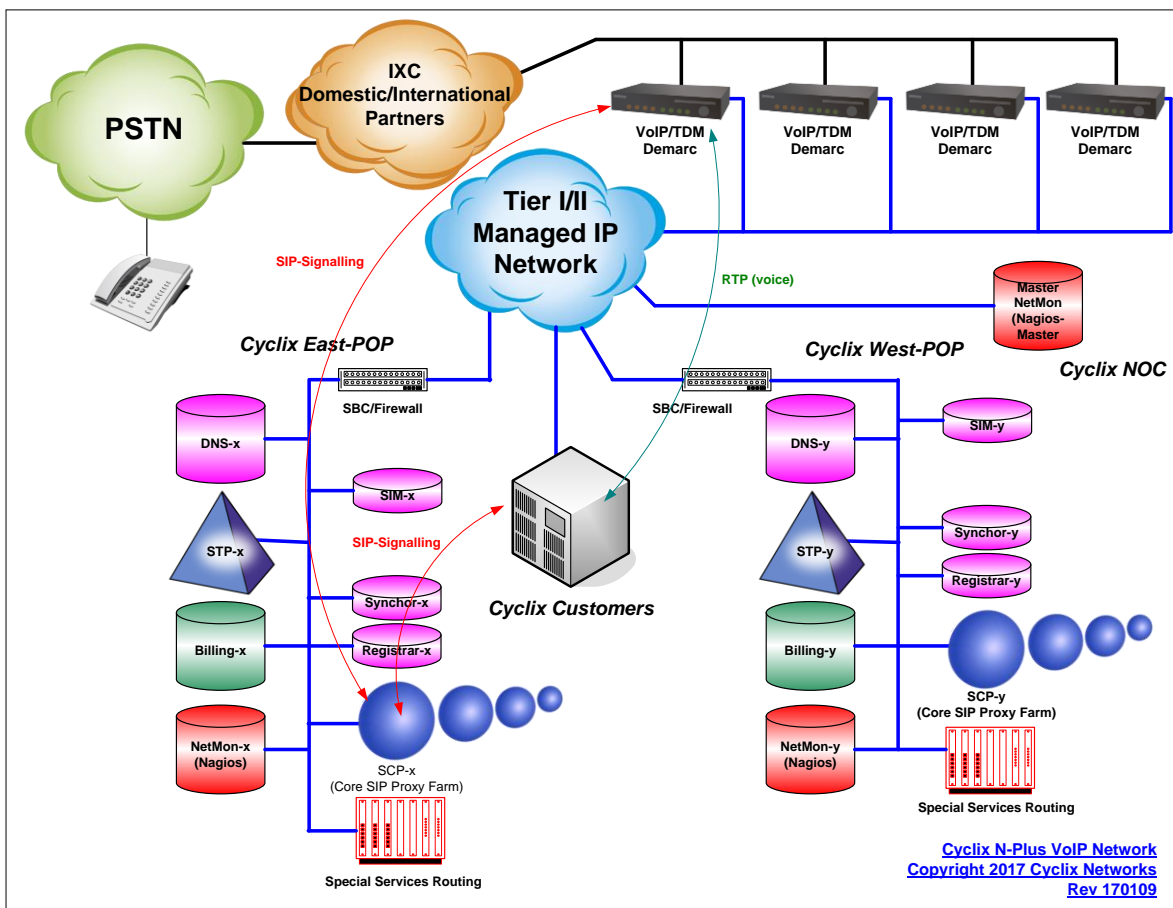
Thus far, the general solution has been to give end point SIP devices hard coded IP (Internet Protocol) addresses to the SIP carrier's proxy. Then, when the SIP carrier's proxy runs out of cycles and can no longer handle any further load, the SIP carrier asks the end user to use another IP address to another SIP proxy.

This approach is problematic as it requires the SIP endpoint device to manage its own traffic termination. At the same time, this also creates single points of failure for the end user. Cyclix Networks has found a way to resolve this dilemma by using a clustered architecture.

## The N+™ Matrix

At the core of the Cyclix network are a pair of DNS (Domain Name System) servers that direct the SIP end point user agents (UA). These Cyclix Networks DNS servers resolve FQDNs (Fully Qualified Domain Names) to a Cyclix proxy address for the UA.

This call re-directed via IP DNS is very similar to something that has been done for decades in the TDM networks with Signaling Transfer Points, or STPs.



This Cyclix DNS STP pair (deployed in groups for redundancy) actually decides which one of N proxies in the Cyclix proxy group will be used to process a given SIP call. It does this by resolving the symbolic FQDN sent by the client UA to a literal in-service IP Cyclix Networks switch point.

DNS STP functionality allows Cyclix to deploy a matrix of N SIP proxies to handle whatever load is required for any given task at hand. This results in virtually no limit to the calls per second (CPS) processing power within the Cyclix Networks signaling domain. The N+™ Network simply scales linearly by adding more proxies to the matrix. Yet, at the same time, no changes are required at the customer UA domain.

Another advantage is that there is no need for the UAs to hard code a carrier's proxy addresses into their configuration schemas. The UA also no longer needs to be concerned with whether or not a proxy can handle its load, or even if the carrier's proxy is in service to handle calls at all.



A fault-tolerant, high transaction SIP network, using this N+™ approach, also eliminates any single point of failure, and realizes redundancy to the n<sup>th</sup> degree. So, the Cyclix Networks N+™ architecture has solved some major technical hurdles that have plagued the SIP marketplace for some time.

## Synching the Matrix

As previously stated, Cyclix Networks has deployed a matrix of proxies, with each client's call being able to use any of the proxies in that matrix at any time. This presents another issue: each proxy must now know registration and routing information for all the SIP endpoints on the Cyclix SIP network.

To solve this problem, Cyclix has created synchronization and registration services to resolve the issue. These services run redundantly in real time, keeping the registration and routing information current and equal across all Cyclix proxies.

In solving these real-time distributed switching database issues, Cyclix Networks has realized another industry first in its approach to dealing with the problem of high capacity telephony signaling on an IP network. The ability to synchronize all proxies in real time creates a distributed virtual switching fabric with unlimited non-stop call processing potential.

Finally, Cyclix ties this unique N+™ architecture back to the PSTN with a wide spectrum of tier one national and international TDM carriers for TDM network access. This gives advanced routing and termination/origination options for all Cyclix Networks customers to or from anywhere in the world.

## Summary

In summary, Cyclix Networks is able to fill a crucial need for the high-volume, mission-critical SIP customer by offering:

- Dynamic non-stop multipoint switching
- High-capacity throughput
- PSTN or better redundancy & reliability
- Multiple routes to any global destination
- Least cost route to any given destination
- Ease of connection to the IP and PSTN networks via DNS

Acting as a high-capacity SIP switching point for SIP endpoints, Cyclix Networks is now a "virtual IP central office to the world" for the SIP end user.



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