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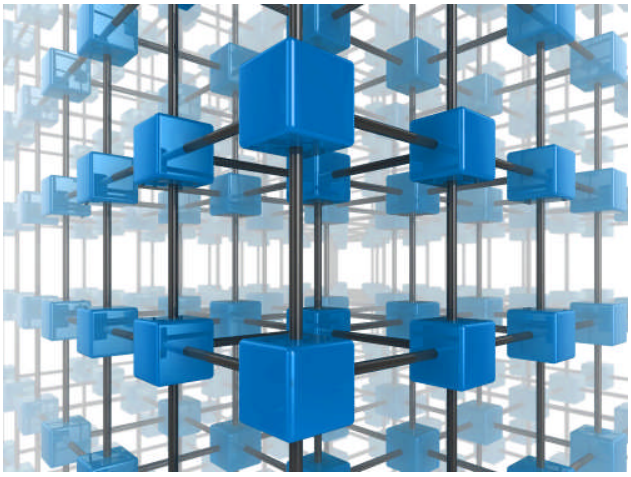
The BandTel N-Plus™ Architecture: A Fault Tolerant High Transaction SIP Network Rev. 110823a



Synopsis

VoIP Technology offers us some wonderful new advantages over TDM switching architectures. One of those is the ability to have a customer's CPE equipment be dynamically tied to a group of N SIP switches, and allow calls to be distributed in real-time across that switch set.

Realizing such an architecture offers redundancy and throughput advantages that are not possible with circuit based technologies. The following paper describes how BandTel achieves that N-Plus(tm) redundant architecture for its client base.

TODAY'S SIP BASED VoIP

VoIP Networks and services have grown way beyond the point of curiosity. In fact, the technology is radically changing the telecommunications industry by attempting to rival and compete with legacy circuit-switched PSTN networks.

But, as with any emerging technology, hurdles will 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.

The problems specifically are:

- **Bandwidth Heavy-** SIP utilizes an abnormally high rate of bandwidth for signaling; i.e. ~15 kbs for each sustained single call per second. That is a lot of data to process for each call!

- **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.

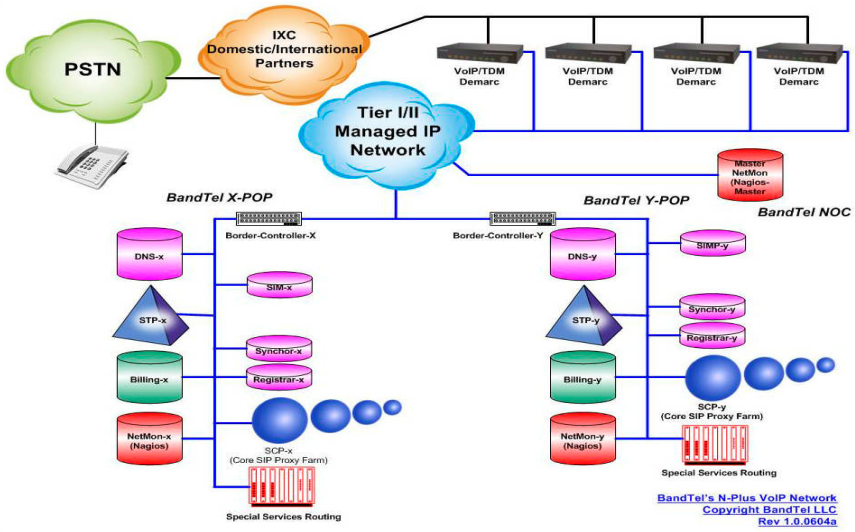
As a result of these issues, today's fastest servers are being challenged when attempting to rival switching speeds of the SS7- ISUP based TDM networks.

Thus far, the general solution has been to give end point SIP devices a hard code IP address to the SIP carrier's proxy (i.e. the SIP switch). Then at the point where the SIP carrier's proxy runs out of cycles, and can no longer handle and can no longer handle any further load, the SIP carrier asks the end user to use yet another IP address to yet another SIP proxy

This approach is problematic in that it requires the SIP endpoint device to now manage its own traffic termination. At the same time this also creates single points of failure for the end user. BandTel has looked at the situation, and found a way to resolve the dilemma by using a clustered architecture.

THE N-PLUS™ MATRIX

At the core of BandTel's network are a pair of DNS servers that direct the SIP end point user agents (UA). The BandTel DNS servers resolve to (what appears to be) a BandTel proxy address for the UA. In reality, the UA is pointed to something new in SIP space, which BandTel calls and STP (signaling transfer point).



This mnemonic/name was adopted from SS7 space because BandTel engineering realized it did something similar to its SS7 counterpart. Specifically, BandTel STPs (deployed in groups for redundancy) actually decide which one of N proxies in the BandTel proxy matrix will be used to process a given SIP call for a given SIP endpoint.

The STP functionality allows BandTel to deploy a matrix of "N" SIP proxies to handle whatever load is required for any given task at hand. There is no limit to the CPS (calls per second) processing power within the BandTel signaling domain. Furthermore, there is no need for the UA's to hard code a carrier's proxy addresses into their configuration schemas. So, the UA no longer needs to be concerned if a proxy has the capacity to handle its load.

A Fault Tolerant High Transaction SIP Network Using this N-Plus™ approach also eliminates any single point of failure, and realizes redundancy to the Nth degree. BandTel's N-Plus™ Architecture solves some major technical hurdles just now surfacing in the SIP market place.

THE SUMMATION

As mentioned prior, BandTel has deployed a matrix of proxies, with each call being able to use any of the proxies in that matrix. This presents another issue. Each proxy must now know registration and routing information for all the SIP endpoints on the BandTel SIP network.

To solve this problem, BandTel has created the "Synchor" and "Registrar" services. These two services run redundantly in real time, keeping the registration and routing information current and equal across all BandTel proxies.

Again, BandTel 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 be able to synchronize all proxies in real time creates a single virtual switching machine with unlimited call processing potential.

Finally, BandTel ties this unique N-Plus™ Architecture back to the PSTN with a wide spectrum of tier one TDM national and international carriers for TDM

network access. This in hand gives advanced routing and termination/origination options for all BandTel customer to or from anywhere in the world.

Stepping back and looking at the whole picture, BandTel is able to fill a critical need for high volume SIP customers by offering:

- 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 PSTN

Acting as a high-capacity homologated SIP switching point for SIP endpoints, and connecting those endpoints to the world, BandTel is now the "virtual IP central office to the world" for the SIP end user.

For further technical information, please contact BandTel sales:

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