QUIZNOS INC.: REPLACING MODEMS WITH IP-BASED POLLING

A large sandwich chain exploits the data found in its ECRs

For years, Quiznos Inc. debated whether it made sense to replace its infrastructure of electronic cash registers to take advantage of polling over the Internet. Quiznos did not want to forklift out their existing NEC 4000 cash registers from 5000 franchise locations to install new registers, but polling using modems was expensive, slow, and unreliable. Numerous alternatives to modem polling were available, but each posed serious cost or deployment obstacles.

In 2007 Quiznos contacted LAVA's engineering group to see what could be done. Quiznos had already investigated LAVA's serial device server products[1] but needed something more specific to their needs. The system that LAVA developed for Quiznos was specifically designed to address ease of installation at the stores; to enable fast, reliable polling; to be cost effective; and to be secure.

With the HQ-ST (headquarters-to-store) Link, Quiznos could reduce the number of phone lines per store from three to two, retaining one each for voice and fax. Since stores were already set up with high speed Internet access to allow franchisees to contact a Quiznos extranet, it made sense to also use that Internet connection for polling.

Together, the characteristics of the HQ-ST Link that LAVA developed made a compelling business case for Quiznos. When they saw it, they wanted the system and they wanted it fast. LAVA engineered and delivered working prototypes in two weeks; a full-scale rollout began in six weeks, and Quiznos was soon deploying ST Plus devices to stores at a rate of over 30 stores a day.

What is the LAVA HQ-ST Link?

LAVA's HQ-ST Link system creates a dedicated high-speed Internet connection from your polling PC to remote cash registers and POS stations. Operation is transparent to both the store hardware and to the polling software.

Quiznos's deployment of the HQ-ST Link consists of ST Plus devices installed at each store. These ST Plus devices communicate with an assigned and dedicated HQ-Plus device at the corporate office. The ST Plus devices are attached to the cash registers in each store, and to the store's Internet connection. NEC's polling software RS-Connect, originally used for polling with modems, runs on corporate office computers and can poll each cash register via the HQ Plus devices, without modifications.

HQ-ST PLUS BENEFITS

Cost Effective

- minimal to no installation time
- no static IP address needed at store
- no phone line, long distance costs

Easy to Use

- no router configuration at store
- no need for any access to store router
- transparent to existing ECRs, POS stations, routers, LANs, computers
- transparent to existing polling applications

Robust

- no Windows OS needed at store or head office
- ST units will restart and reconnect to HQ automatically

Flexible

- store ECRs can be remotely managed (with new pricing updates, for example)
- ST units can be set up using a number of methods:
  - through the ST unit serial port
  - using HTTP at store
  - at head office
  - using a set-up server

Reliable

- no need to have a phone line available for polling access

Scalable

- works regardless of number of remote locations
- ST units' firmware remotely upgradable

Fast

- IP connection faster than modem dialing

Clear Feedback

- HQ-Basic shows all live connections; which stores are up, down

Secure

- HQ-ST authentication codes
- no router holes (port mappings) at store
- HQ units only talk to ST units
- ST units only talk to HQ units
- resistant to denial-of-service attacks
- head office network is not opened to store (as in the case of a VPN)
- store unit can be activated to make store tampering impossible
- no passwords

The Business Case from Quiznos's Point of View

Savings: eliminating phone lines

By using ST Plus devices in stores, and polling over IP, Quiznos has been able to eliminate one of the three phone lines running into each store (two still exist; one for voice and one for fax).

In addition, Quiznos has been able to cut down on phone lines not just at the store, but also at the corporate office. When polling by modem, they were polling 1500 stores out of their chain of 5000, using 15 corporate office modems and phone lines to poll 1500 stores, 100 stores per server. Now, they no longer need those lines.

Savings: reducing servers

Quiznos's corporate office modem polling configuration was polling 100 stores per server. With the LAVA HQ-ST Link they now poll 300 stores per server, reducing the need for servers per store to one third.

Savings: cutting ECR reprogramming costs

Quiznos is also experiencing great savings and increased flexibility when downloading menu information to store cash registers. With modem connections being as unreliable as they were, changing a cash register's information required that the store send the unit to the corporate office, where it was reprogrammed and sent back to the store, at a cost of about $300 per change per store. In the meantime the store was doing its business on paper.

With the LAVA HQ ST Plus, Quiznos is able to redo menus centrally and quickly. They just completely redid the store menus in New York, entirely over their high speed HQ-ST Link connections.

1. In particular, Quiznos had looked at the Ether-Serial Link from LAVA. This device met Quiznos's polling requirement but in Quiznos's case did not provide a total solution. While providing a cost-effective IP upgrade to existing serial-based cash registers, it would still require a static IP address at each store, and for a technician to visit a location if a firmware upgrade was being performed.

Savings: reducing support costs

As Jane Govier, Quiznos's Manager of Store Operations and Technology points out, every store setup is the same, and "troubleshooting is simpler." Things are much better now on the support side, and Quiznos is reworking their corporate office support desk, as they now require fewer people doing follow-up on missed polls. They no longer also depend on the store to answer the phone for a poll and Jane says, "reliability of info is huge."

Savings: securing royalty payments

Collecting franchise royalties requires timely and accurate data on store sales. Quiznos faced the difficulty of polling, using modems, 5000 locations nightly.

However, this polling was essential to Quiznos's business model: franchise royalties are calculated directly on sales figures, and Quiznos needed to know that it could depend on complete and reliable store data every day.

The HQ-ST Link answered two problems here: it was fast enough to make it possible for Quiznos to complete a full polling cycle every night, and it gave Quiznos the ability to see which stores were on-line and which were not at any given time.

Savings: no static IP address at stores

A third major source of savings comes to Quiznos from the fact that, unlike any other IP-based polling system, the HQ-ST Link does not need a static IP address at the store location. Even if the IP address of the store's router is changed by the Internet Service Provider (ISP) providing Internet connectivity, even if IP addresses on the store's LAN are dynamically allocated by a DHCP server, the ST Plus will still call home to the head office and re-establish connection. Once connected, the HQ Plus periodically issues a "keep alive" signal to the ST Plus, ensuring connections are maintained.

LAVA has achieved this capability by turning the headquarters-to-store connection front to back, in network terms. Most IP-based polling works on the principle that the head office is the client and that the polling software contacts the store. This requires the devices on a store's network to be open to the Internet.

The HQ-ST Link makes the store device the initiator of the connection, so it is unnecessary for the store to have a static IP address. All requirements for router configuration move to the head office.

The only other polling system out there that does not require a static IP address at the store is FTP, whereby a store sends sales information to an FTP server. This is not actually polling, however, and this method also lacks the ability for bi-directional communication. FTP will not work if a head office wants complete control in updating pricing or SKUs on remote cash registers or POS systems.

ISPs typically charge a premium for supplying a static IP address. Not having a static IP address at the store is a huge savings for Quiznos—millions of dollars a year, literally.

Annual savings on static IP addresses	
Savings/store[a]	$480.00
Chain-wide savings[b]	$2,400,000.00

a. Computed at $40/month/static IP address.
b. Computed over 5000 stores

Savings: no long distance telephone

By using the HQ-ST Link, Quiznos can continue to use their NEC 4000 ECRs, but now that these registers are IP-enabled, Quiznos can dispense with the long distance charges associated with polling by modem.

As with the ongoing costs of maintaining static IP addresses, the ongoing costs of long distance polling, once eliminated, represent substantial savings:

Annual savings on long-distance	
Savings/store[a]	$45.63
Chain-wide savings[b]	$228,150.00

a. Computed at $0.05/minute, 2.5 minutes/poll, one poll/store/day.
b. Computed over 5000 stores

Savings: reduced installation costs

Although not an issue in converting Quiznos's systems from modem polling to an IP-based system, the cost of installing new infrastructure can often be significant. The cost of a new cash register is just one thing. Sending an installer to each store, and having that installer locate or install a router, configure that router, and establish conductivity with the head office, can cost organizations hundreds of dollars per location.

Worse, sometimes the franchise location is a part of a mall, where Internet service is provided to all mall tenants centrally, and access to the router is simply not available.

Now, an organiztion can configure an ST Plus at its head office and simply send it to a store, confident it will install smoothly. Reducing installation time and trouble can often pays for the new store hardware immediately, making the payback period is zero.

Quiznos's Polling Scenario

Quiznos polls all its stores from its corporate office in Denver, Colorado. NEC's RS-Connect software is used to poll Quiznos's Q-POS store devices, slightly modified NEC 4000 ECRs. While this provides essential centralized visibility, it also means a significant investment in polling infrastructure. By eliminating modems from their polling operation wherever Internet connectivity exists, Quiznos has reduced the need for a pool of modems at its corporate office.

Instead, their corporate office is now equipped with HQ Plus-126 devices, each monitoring up to 100 store locations, allowing room for expansion on each HQ Plus. Their HQ Plus devices are identified by geographical territory, because Quiznos polls at night when their stores are closed, in various time zones.

Right now Quiznos is polling 85% of their Q-POS stations, pushing 3000 locations right now. They expect 100% of Internet-accessible stores to be using ST Plus devices in the future, and are currently deploying ST Plus devices to stores in Canada and Puerto Rico.

Quiznos's Deployment Technique

Quiznos has managed the deployment of ST Plus devices into stores very simply and effectively. Its method takes advantage of the fact that the ST Plus has been designed to allow configuration over an Internet connection. This remote capability, intended to reduce maintenance costs by

eliminating the need to visit stores when updating ST Plus devices, has been used by Quiznos to further simplify installation, reducing installation costs.

Here's how it works: each ST Plus placed in a store is configured with just one piece of data, and the same data in every case—the "call home" IP address of the head office HQ Plus that it will contact. Once connected to the ECR and powered up, the first thing that a store device does is contact its assigned head office device. In Quiznos's case, all ST Plus devices are deployed to stores pre-programmed with precisely the same HP Plus IP address. These store units then contact the corporate office. Once they are connected to the corporate office in Denver, they are reconfigured by the corporate office with a new "call home" IP address, that will redirect the store's next connection to the polling server it will use in the future. Other store-specific information is added to the ST Plus at the same time.

> "Quiznos's close work with LAVA's engineering group has led to production versions of the firmware that have excellent reliability for both HQ Plus and ST Plus."
>
> — Brett Dangerfield, Manager IT Deployment Quiznos

Quiznos still sends installers to stores, but installation is much simpler with no port forwarding required.The simplicity of installing ST Plus devices is "huge from an installer standpoint," according to Brett Dangerfield, Quiznos's IT Manager in charge of HQ-ST Link deployment. He points out that DSL modems, port forwarding methods, bridging methods, and ISPs vary widely, and number in the hundreds throughout the United States. However, as all DSL connections use routers, ST Plus installations are the same everywhere. Since 98% of Quiznos locations are configured using DHCP, that aspect of installation is also easy.

State of the Art

Quiznos also realizes a significant speed increase in their polling operation when using HQ-ST Links. Where a modem would need to dial, handshake, and establish a connection, a process taking up to 45 seconds, establishing a connection with head office now takes only moments. That in itself makes the difference between completing a poll of all stores overnight or not.

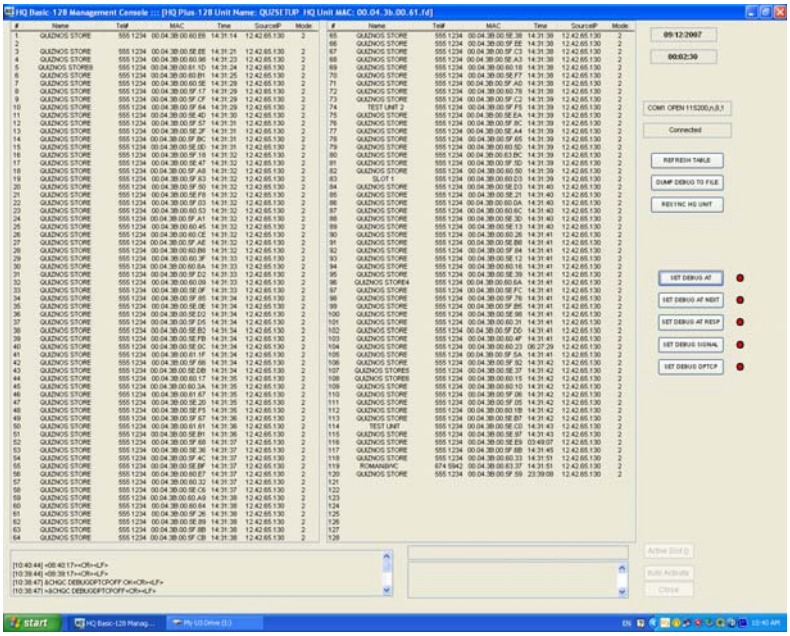
Once up and running, the process is simple. Each night Quiznos gathers the polling information using its HQ Plus devices, and dumps that data into a large centralized database, where it can be used.

Quiznos now has a system that is more robust, and as Jane Govier says, Quiznos gets "more data on a more regular basis."

Chain-Wide Visibility: HQ Basic

Software included with the HQ Plus, called "HQ Basic", gives a window on the polling activity of any given HQ Plus. At a glance, in a single screen, the head office can see all active connections to that headquarters device. In addition, the HQ Basic software provides a configuration interface for changing port and network settings on either the HQ Plus that is attached or the ST Plus devices that are connecting to that HQ Plus.

It is through this interface that Quiznos manages both its deployment of new ST Plus devices, and its polling of stores already on-line.



Reliable Connectivity

Also important for Quiznos is the fact that the system is extremely robust.

With a wide-flung geographical deployment, Quiznos wants to avoid troubleshooting visits to stores. Similarly, with so many stores reporting to a central location, head office reliability is also critical. LAVA's engineering and hardware concepts have delivered a system that will not quit.

Store units' firmware was thoroughly field-tested and verified, and the HQ Plus design for Quiznos underwent several versions, taking into account such specific demands as conforming to the security requirements of Quiznos's head office routers, to ensure trouble-free operation.

Moreover, connections are made more reliable by the fact that if power is lost at the store and subsequently restored, the ST Plus device will automatically re-establish its connection with the headquarters.

And, as neither the HQ Plus nor the ST Plus is a computer, the polling link does not rely on the inherently unstable nature of PCs and consumer-level operating systems.

Security

The HQ ST Plus Link provides a highly secure dedicated IP connection. ST Plus devices located in stores will talk only to their designated HQ Plus. Similarly, HQ Plus devices will talk only to ST Plus devices that have a matching authentication code: ST Plus devices sold to one company will not talk to HQ Plus devices from another and vice versa. Seen from the headquarters perspective, this is a unique one-to-many topology.

This aspect of HQ-ST Link's design makes it especially resistant to denial of service attacks.

Once deployed and connected, the store units can be locked down so that further configuration from the store cannot be effected. This gives Quiznos a high degree of assurance that the franchisee will leave the system in place as it has been configured.

The ST Plus devices use no passwords, and so are free from the danger of "slips" in which a password is exposed or forgotten.

Finally, and perhaps most importantly, because a store unit operates as the client rather than the server, there is no need to open IP ports on a store's router. This closes one large security hole that exists in many other IP-based polling designs.

Summary

Quiznos's polling solution is now complete. Thanks to LAVA's HQ-ST Link, they have a reliable and secure system for polling their chain, and one that saves them very big dollars.

They no longer need three phone lines per store, they can deploy devices quickly and easily, they can secure the information they need for collecting franchise royalties, and they are realizing huge ongoing savings by eliminating costs for static IP addresses or long distance telephne calls to complete polls.

The HQ-ST Link system that Quiznos has deployed is now available in a generic version from LAVA, ready for use in any other company's similar polling setting. LAVA has developed versions of HQ Plus that can handle up to 126, 30, or 8 store connections, making the HQ-ST Link system ideal for retailers of any size.

The big savings and big benefits of ECR polling that Quiznos has seen can now be attained by any organization.

"To date we have over 3000 of our 5000 stores polling using LAVA's system and are migrating the remainder at a rate of 30 stores per day. I have to say it is a pleasure working with LAVA. I recommend them to any franchisor considering implementing IP-based polling."

— Jane Govier, Manager
Store Operations & Technology
Quiznos

About LAVA

LAVA designs and manufactures hardware that provides system integrators and end users with simple serial-to-PC and serial-to-Ethernet connectivity. The LAVA product line includes multi-port serial boards, Ethernet-to-serial device servers, links for legacy payment terminals, and headquarters-to-store links for cash register polling.

We serve customers around the globe in a wide array of industries, including Point of Sale, Telecommunications, Light Industrial Automation, Payment Processing, Building Automation, Gaming, and Restaurant & Hospitality. Our connectivity hardware suits any design needing more COM ports or remote monitoring and control of serial equipment over IP (Internet Protocol).

All LAVA hardware is covered by the LAVA Lifetime Warranty: any LAVA product that fails in its intended purpose will be replaced or repaired.

About Quiznos

Headquartered in Denver, Colorado, Quiznos Inc. leads its industry as the premier submarine sandwich provider.