



## *Linux WAN Router Case Study*

### **Application: ATM in Wireless Hot Spot Solution**

### **Customer: Advanced Network Technology Laboratories (ANTlabs)**

#### **Profile**

ANTlabs is the developer of the patented wireless hot spot technology called ezXcess™ SSG that powers 80% of Singapore Telecom's wireless access points located in Singapore.

#### **Company Overview**

Advanced Network Technology Laboratories (ANTlabs) is focused on the research, development and commercialization of enabling technologies for wireless and broadband networks, visitor-based networking, and network security solutions. ANTLabs is the region's technology leader and innovator of zero-configuration wireless and broadband Internet access; authentication, authorization, and accounting (AAA) service gateways; wireless internet roaming, and network security solutions. ANTLabs products power 80% of the more than 200 public wireless hot spots in Singapore, and are used throughout southeast Asia in major hotels, airports, transportation centers, and public wireless networks.

#### **Goals**

[Zero-configuration hot spot aggregation](#)

[Highly scalable service gateways](#)

[Increased customer capacity](#)

[Fully integrated solution](#)

[Improved cost structure](#)

#### **Network Challenge**

To expand their ezXcess SSG platform, ANTLabs needed to connect multiple ezXcess systems via ATM circuits to a central billing site. Their original design had to rely on multiple, non-integrated authentication, authorization, and accounting (AAA) gateways. Multiple service gateway sites also dramatically increased the cost to roll out wireless networks, a significant barrier to new wireless network installations. Major networking customers, such as Singapore Telecom, required a single, fully redundant service gateway site. These new, highly scalable sites would have to integrate regional, national, and multi-national wireless networks into a single Internet access point, but had to maintain the same zero-configuration capabilities and reasonable cost structures as previous single-site designs.

To accommodate SingTel's broad network rollout, the ANTLabs' service gateway site needed to support up to 4 ATM OC3 circuits to connect remote wireless networks. Each router used at the service gateway site was required to support up to 1000 ATM virtual circuits per OC3, with each ATM virtual circuit representing a wireless hot spot.



To facilitate zero-configuration access, each ATM virtual circuit is mapped to an ethernet VLAN connected to the AAA gateway. When a user at a remote wireless hot spot makes an Internet access request, the request is forwarded over the ATM network to the router and sent via gigabit ethernet to the AAA gateway. The AAA gateway authenticates the user and can provide immediate access to the Internet or reply with a request for payment. To maintain cost structures, the router in ANTLabs' design had to support up to 1000 ethernet VLANs and 1000 bridge groups per OC3. Each router had to provide maximum security, including secure encrypted command line configuration access.

ANTlabs tested 7200 series and 7500 series routers from Cisco Systems in their aggregated service gateway. When loaded with more than 50 ATM virtual circuits, 50 bridge groups, and 50 VLANs, the Cisco routers became unstable. When the configuration reached 100 ATM virtual circuits, bridges, and VLANs, the Cisco routers' boot times had increased to nearly 45 minutes, and the routers crashed when traffic was sent across the router to the AAA gateway.

ANTlabs is a savvy company, in tune with the fundamentals necessary to be an industry leader. With this insight into market forces, ANTLabs was aware that it had to convince both existing and potential customers to adopt their wireless technology platform, in particular the ability to aggregate wireless hot spots into a single service gateway site, before it could make headway in the southeast Asia market. For ANTLabs, stimulating market demand depended on the ability to provide a seamless wireless technology over ATM which was not only stable and cost effective, but also universally suitable for small and large installations.

Existing proprietary routers did not meet any of these targets.

## **The ImageStream Solution**

To support this application, ANTLabs deployed ImageStream's Gateway Router™, a router built using powerful standards-based commodity hardware. ImageStream's Enterprise Linux™ router distribution and scalable SAND driver architecture provided ANTLabs with a secure, scalable platform. Configured with 1000 ATM virtual circuits, bridges, and VLANs, the ImageStream routers booted in under five minutes, were stable under load, and scaled easily to support multiple OC3 ports. Even with more than 3000 total interfaces on the system, the ImageStream router was able to sustain wire-speed OC3 data rates and pass SingTel's stringent requirements.

The Gateway Router also provided a superior price structure. ANTLabs' complete Gateway Router configuration carries an MSRP of less than the ATM OC3 card for the Cisco 7500 series router alone. As bandwidth and infrastructure continue to evolve into commodity markets, ANTLabs' customers are increasingly price-sensitive and application-focused. The Gateway Router allows ANTLabs to deliver a high-performance solution at an attractive price in the competitive Asia-Pacific marketplace.

ANTlabs has adopted the Gateway Router as an integral part of their service gateways throughout the Asia-Pacific region. Ricky Chan, Business Solution Manager of ANTLabs, said, "SingTel selected ANTLabs' ezXcess SSG to power Singapore's nationwide network of wireless hot spots. ImageStream's router, bundled as a part of our service gateway, helped us win this customer, and will be an important part of our offerings in Asia."

By leveraging the scalability of the Gateway Router, ANTLabs increased their service gateway capacity by a factor of 20. With the superior price and performance of its Intel architecture, the Gateway Router



easily supports the 1000 customer minimum required by ANTLabs, and also provides an upgrade path to support over 4000 customers per service gateway site.

“ImageStream has an innovative solution, and by optimizing the application to run on Intel's building blocks, they can offer service providers lower costs, faster response times, support for more users, increased transaction rates, improved scalability and enhanced manageability,” said Lai Yit Loong, Singapore Country Manager, Intel Technology Asia. “ImageStream has developed a comprehensive portfolio of solutions on the Intel platform, which reinforces Intel's leadership in next generation wired and wireless network infrastructure.”

Doug Hass, OEM Product Manager for ImageStream, said, “ANTLabs is an aggressive, visionary company with a unique technology that is poised to make the Asia-Pacific region a world leader in wireless infrastructure.” Hass added, “Our expertise in scalable routing solutions will put ImageStream at the center of some of the most exciting network deployments of this decade.”

ImageStream's distributor in Singapore, Telogic Pte Ltd, worked with ANTLabs to develop the solution for SingTel. Kim Seng Low, President of Telogic, said, “We are very excited to develop this new opportunity with ANTLabs because there is strong demand in the wireless service provider market for hot-spot solutions. We believe that ANTLabs' decision to bundle ImageStream routers with their hot-spot technology will save SingTel millions of dollars over the life of the network.”

## Key benefits

Quality and Reliability

Performance

Maximum return on investment (ROI)

## Business Benefits

**Quality and Reliability:** The ImageStream Gateway Router is a well-established commodity router that runs Linux. As a part of the Industrial Series router line, the Gateway Router uses an Intel architecture, PCI-based hardware, and a customized Linux operating system. These technologies are established, and proven in a wide range of applications around the world. Its blend of connectivity options, standard services, and rock-solid reliability has made the Gateway Router the high-performance router of choice for many ImageStream customers. The base Gateway Router includes support for the advanced features required for high-performance wireless infrastructure, including dynamic routing, quality of service (QoS), and support for Digital Subscriber Line (DSL) core and edge applications. Customers who select an ImageStream router are investing in proven technology that is deployed throughout the world.

**Performance:** With a total backplane bandwidth of 12 Gbps, and the processing power to handle OC12 applications at wire speed, even in complex configurations, the Gateway Router is the fastest single-processor ImageStream Router. In addition, the next-generation Intel Pentium 4 processor guarantees continued performance improvements, giving customers like ANTLabs the power they need to support growing customers over time.



**Maximizing ROI:** The ImageStream Gateway Router provides outstanding value as the lowest priced router in its class. The Gateway Router offers unmatched configuration options with up to 96 ports per chassis. In addition, the Gateway's modular processor card and port adapters protect customer investments by providing an upgradeable platform that can be redeployed as network needs grow.

## **About ImageStream**

ImageStream is a supplier of LAN and WAN solutions for small offices, corporate LANs and WANs, Internet backbone providers, and telecommunications carriers. ImageStream products include Linux routers, WAN cards, and network management software. ImageStream is headquartered in Plymouth, Indiana.

## **About ANTLabs**

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## **About Telogic**

Telogic Pte Ltd (<http://www.telogic.com.sg>) is a leading telecommunications solution provider with activities across the Asia Pacific region. The company designs and distributes a wide range of voice and data communications products to support the requirements of converged communications applications. Telogic is headquartered in Singapore, with offices in Indonesia, Malaysia and Thailand, and a network of partners in China and Southeast Asia.

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