

North American Service Provider to Deploy the First Integrated Mobile Satellite and Terrestrial Network

TerreStar Networks chooses Cisco® IP next-generation core based on high availability, flexibility, and direct interconnect.

EXECUTIVE SUMMARY

TerreStar Networks

- Telecommunications
- Reston, VA

Business Challenges

- Deliver reliable, high-quality and interoperable satellite and terrestrial mobile communication service to key customers (government and commercial enterprises)
- Scale to support hundreds of thousands of first responders across the country
- Meet the unique government requirements and apply them to an IP backbone
- Create specialized applications and offer customers the ability to onboard their applications to the mobile network

Network Solutions

- Cisco's low-/mid-/high-end routing and switching platforms serve as the next-generation network infrastructure
- Cisco's Multi-Service Blade for Session Border Control (SBC)
- Cisco's IOS® XR software for secure routing applications and nonstop operations
- All-IP experience to the handset

Business Results

- Ability to support three sales channels: government, commercial, and wholesale
- Satisfy a number of unique government-oriented requirements in terms of network performance and security
- Manage real-time multimedia traffic flows between IP network borders, handling signaling and media
- Minimize time-division multiplexing (TDM)-based handoff to other service provider networks

Business Challenges

Mobile communications have become a critical component of modern operations for many businesses and government agencies. Several national emergencies – most recently the events of 9/11 and Hurricane Katrina – have resulted in the failure of traditional land line and cellular communications systems in the affected areas. This leads to the conclusion that North America must have sufficient and reliable communications available in times of crisis in order to save lives. Advanced mobile satellite services are part of the solution as they provide communications that are fully survivable during the worst events or in the most remote areas. These services will dramatically improve reliability and quality of coverage for first responders and law enforcement, as well as for remote communities.

Advanced mobile satellite services will also provide affordable, sophisticated mobile voice and data services to consumers in traditionally underserved areas, especially rural parts of North America. These areas are home to millions of Americans and Canadians, and to key industries such as agriculture, natural resource exploration, and transportation. These communities and businesses alike will benefit immensely from the reliable mobile communications provided by mobile satellites.

In April 2006, TerreStar Networks announced its intention to build, deploy, and operate North America's first next-generation integrated mobile satellite and terrestrial communications network that will provide universal access and tailored applications throughout North America over conventional wireless devices. TerreStar's integrated Mobile Satellite Service and Ancillary Terrestrial Component (MSS/ATC) network will effectively end the possibility of "dead zone" cell-phone coverage by transitioning transparently between satellite and terrestrial resources.

"The challenge was to create a transport network that would be IP-based from the start," said Jeff Stern, vice president, application products at TerreStar. "We wanted a very high-availability, resilient next-generation network (NGN) infrastructure that enables scaling services and supports the unique requirements of our government and enterprise customers."

As the nation's first all-IP mobile communications network, TerreStar's stringent network requirements included:

- **High availability.** Extremely high network uptime is required, including the ability to perform in-service software upgrades and sub-50 ms traffic failovers in case of a link failure.
- **Scalability.** The core needs to scale to support many agencies and hundreds of thousands of first responders across the country.
- **Services Integration.** A seamless service integration of high-touch services in the main edge platforms is required without inserting additional appliances and creating an overlay

network. And, effectively handling and prioritizing the voice-over-IP (VoIP) traffic flowing between main point-of-presence (POP) sites is fundamental to the success of TerreStar's offering.

- **Security.** Provide solid network level encryption of sensitive user data, as well as complete topology hiding for both TerreStar and customer services infrastructure. This must integrate with other device, application, and user identity-oriented security methods.
- **Predictable and robust quality-of-service (QoS) performance.** Because multiple services will be transported over TerreStar's network, low-latency or mission-critical traffic must be prioritized over ordinary, less time-sensitive packets. Endpoints and application servers are hidden from each other behind firewalls. An effective session border control mechanism must reliably support complex communication and signaling flows that are driven by feature interactions.

Network Solutions

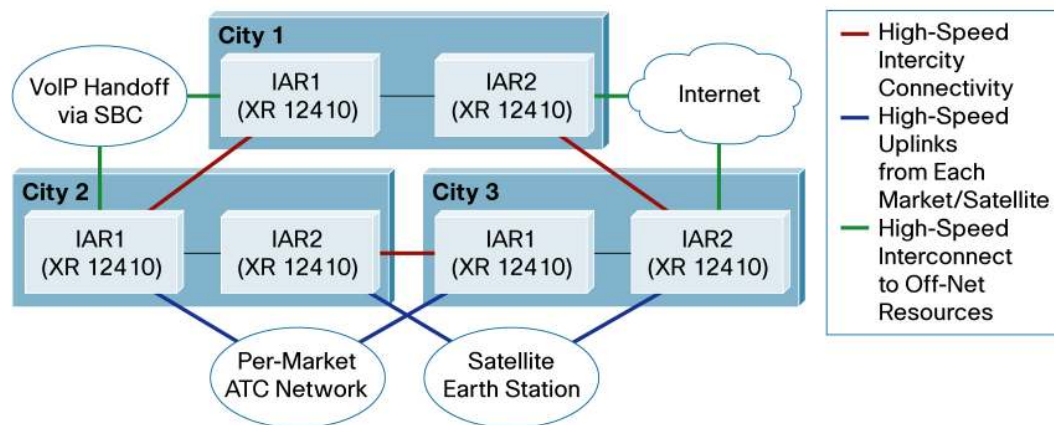
TerreStar evaluated several options for each unique criterion and selected Cisco's XR 12410 for the core of its next-generation network. The platform enables all VoIP traffic to be carried while meeting availability and latency requirements. Also, the line cards can support TerreStar's potential circuit loading, helping ensure a robust and scalable solution as the number of users and applications grow. This not only benefits TerreStar's optimized network blueprint, but also enables scalability beyond other like cellular operators. The XR 12410 IP core router will utilize Cisco's IOS XR software, a real-time microkernel-based operating systems that supports in-service software upgrades for operational simplicity.

"Choosing a partner was as important in our selection as product scalability, security, and services integration," says Stern. "Cisco not only offers a resilient and scalable platform, but as a company, they have the necessary resources and relationships already in place that will enable us to develop and deliver this emerging technology. As both a technology provider and an expert in our industry, Cisco minimizes our risk as we build and deploy products and applications over a fully optimized IP-enabled network."

In the areas of core network and application delivery, TerreStar and Cisco are working closely on several unique technology programs that will enable TerreStar to create solutions that deliver significant value to their end client markets. TerreStar is creating the first IP to the handset, mobile network, which allows efficient use of network resources, seamless switching between terrestrial base station and satellite, ease of deployment for new services as they become available, and top-quality service-level agreements (SLAs). With the integration of session border control functions into Layer 2 and Layer 3 services provided by the XR 12410, TerreStar is able to simplify their network configuration while allowing greater flexibility for connectivity.

Service Integration

One of the key network elements is the integration of the high-touch services into the main edge platforms. Cisco presents the first-in-market SBC integration into the XR 12000 platform. The XR 12000 platform was selected as the Intercity Aggregation Routers (IAR) – as shown in the figure below – and plays a key role with regards to handling the VoIP and other real-time, session-based IP application traffic flowing between TerreStar's main POP sites.



This SBC integration provides a transparent service insertion into the network without adding appliances and creating overlay networks. The integrated SBC provides the following functionality:

- Protocol-level translation and adjustment
- Enhanced security of the VoIP traffic in the network
- Enforced policies and QoS on a per-customer basis
- Collection of statistical information for billing purposes

The Cisco XR 12000 Session Border Controller application takes advantage of the advanced hardware processing capabilities of the Cisco XR 12000 MSB to provide a flexible, scalable, and feature-rich implementation. The integration of session border control into the Cisco XR 12000 Series routers facilitates the deployment of TerreStar's services that require a combination of Layer 2 and Layer 3 functions and session border control functions. The modularity of the Cisco XR 12000 Session Border Controller application and of Cisco's IOS XR software enables TerreStar to load, configure, turn on, and turn off session border control functions with zero impact to any other control and data plane traffic on the same router.

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– Jeff Stern, Vice President, Application Products, TerreStar Networks

Business Results

With the end-to-end Cisco IP solution and infrastructure in place, TerreStar will be the first fourth-generation operator to offer customer-designed products and applications over a fully optimized IP-enabled network. “Thanks to the efficiency of having one service router provider, Cisco, and of this technology, we will be able to rapidly deploy the network and quickly and transparently add new services to meet any future customer requirements,” says Mike Tanner, vice president, core network engineering at TerreStar. “It is basically an opportunity for us to be on the forefront, starting with the Greenfield deployment and then moving to the future quicker without having existing gear to migrate and interoperate.”

The Cisco XR 12410 with session border control provides TerreStar with simultaneous session capacity, as well as continuous operation and extended system longevity to underpin investment

protection for next-generation services. With the integration of Session Border Control functions into Layer 2 and Layer 3 services provided by the XR 12410, TerreStar is able to simplify their network configuration while allowing greater flexibility for connectivity.

Tanner says, “The return on our investment with the tight integration of the SBC into the overall routing scheme is immediate. There is no need for another appliance. Therefore, we reduce costs by minimizing capital expense, rack space, and power supply requirements. More importantly, we anticipate this tighter integration to have a positive impact on the quality of service to our customer.”

The service integration into the XR 12000 platform helps cut TerreStar’s total cost of ownership (TCO) by:

- Reducing the number of installed equipment devices in the POPs
- Migrating SBC functionality into the network infrastructure
- Minimizing the number of operating systems to qualify and deploy (IOS-XR is used to configure and manage the Session Border Controller)
- Achieving nondisruptive stateful failover in a single chassis
- Providing scalability for future customer service requirements with the MSB that runs the SBC application

PRODUCT LIST	
Routing and Switching	
• Cisco 12000 Routers	
• Cisco 7609 Routers	
• Cisco Catalyst® 6509 Switches	
• Cisco Catalyst® 4948 Switches	
• Cisco’s Multi-Service Blade for Session Border Control	
• Cisco IOS XR Software	
• Cisco Land Mobile Radio (LMR) Gateway	
• Cisco IP Interoperability and Collaboration System (IPICS)	
Voice Communications	
• Cisco Unified CallManager with Session Initiation Protocol (SIP)	
Optical Networking	
• Cisco ONS 15454 Multiservice Provisioning Platform	

“We made the right choice by selecting a Cisco IP network and architecture. Cisco has provided us with a single-vendor, end-to-end solution that gives us confidence about network performance, scalability, and security. As we plan, build, and deploy our first next-generation integrated mobile satellite and terrestrial communications network, we are sure that Cisco will continue as a strategic partner in the years to come,” says Stern.

For More Information

Cisco core routing solutions have already helped businesses and service providers around the world reduce costs, streamline service provisioning, and support a wide range of new applications. To find out how Cisco can help your organization, contact your local account representative or visit <http://www.cisco.com/go/mobile>.



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