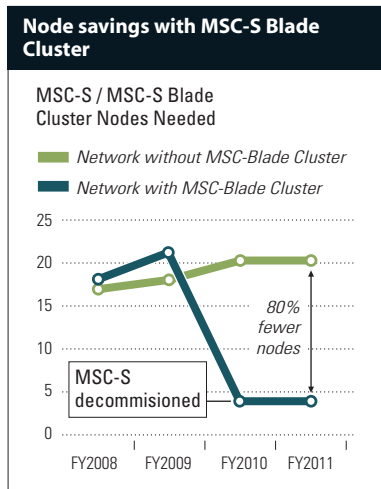
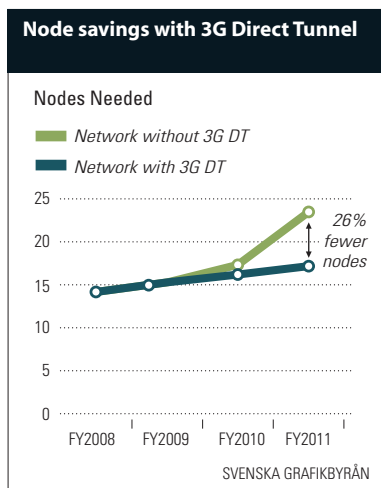


# The Telstra case – a radical approach to the mobile core

Telstra, Australia's biggest telecommunications company, is three years into a five-year strategic network transformation program. One of the program's essential components is the radically enhanced mobile core network, which is already **boosting revenues** and luring customers from its rivals.



► **THE TELSTRA CASE** demonstrates the result of the intimate connection between network strategy and business development. It identifies the major strategic and commercial drivers that have made Telstra's "Next G" (Next G is a Telstra trademark) core network arguably the world's most advanced mobile core network today.

In October 2006, Telstra launched its 3G mobile network offering, branded "Next G". While not the first 3G network in Australia, the Next G network has subsequently become the most successful, forming the largest part of Telstra's 43 percent mobile market share (UBS estimates). Of particular importance is the success of the Next G network for mobile broadband in achieving 60 percent market share and generating 90 percent of the growth in annual mobiles revenue for Telstra last year (2007) (Goldman Sachs JBWere).

Telstra promotes its network as having superior coverage to competitors' networks. In a country the size of Australia and with a population density that varies from metropolitan and regional cities to large, empty, remote regions, achieving national coverage is difficult and costly. Consequently, many Australians recognize national coverage as a valuable differentiator. Telstra claims that the Next G network covers more than 99 percent of Australia's population today – a formidable achievement.

Telstra also promotes its network as having superior performance compared to competitors' networks. In particular, it has achieved considerable success with the delivery of HSPA services to laptop computers for mobile broadband and internet access, consistently offering faster and faster speeds to subscribers. While the Next G network currently delivers downlink speeds of up to 14.4Mbps, the company announced in July 2008 the commencement of HSPA+ ("evolved HSPA") trials offering downlink speeds of up to 21Mbps, and it anticipates 42Mbps in 2009.

Clearly, faster access speeds for

subscribers require faster radio access networks. No less important is increasing the capacity and speed of the mobile core network. Without a major core network transformation, Telstra's Next G network would never be able to sustain the growth in circuit-switched voice and data usage that has been experienced.

Since 1996 Telstra has operated two 2G mobile networks, the GSM "Telstra Mobile" covering urban areas at 900MHz; and "Telstra CDMA" covering rural and urban areas at 850MHz.

Telstra's competitors Vodafone and Optus/SingTel have both operated GSM networks, though with less coverage than Telstra. Several other organizations have resold services based on these networks, such as Virgin Mobile, which resold services from the Optus/SingTel network.

In 2003 the challenger operator Hutchison entered the market with the first 3G network in Australia, branded "3." This network operates in the 2100MHz band. Subsequently (in 2005) Telstra negotiated an agreement with Hutchison providing for expansion and sharing of the radio network, which is operated by 3GIS, a joint-venture company formed by Telstra and Hutchison for this purpose.

This strategy provided Telstra with the opportunity to quickly introduce 3G services at a frequency range for which handsets were readily available (2100MHz). However, it left Telstra with three distinct and inconsistent mobile networks, each with different features, pricing and coverage. This situation was complicated for end users and costly for Telstra. Furthermore, while traffic on the 2G network was still growing, the 2G core network was approaching the end of its service life.

In 2005 Telstra announced its intention to reorganize its mobile networks, focusing on growing its next-generation 3G mobile business as the successor to both 2G and CDMA. This was to be achieved by building a new nationwide mobile network: a 3G network operating at 850MHz,



**“Integration and convergence are critical for Telstra”**



**Mike Wright, Executive Director, Telstra Wireless Engineering and Operations.**

► **Was it a difficult process to get the go-ahead for a radical overhaul of the mobile cores?**

In planning the Next G network, we set out to fundamentally transform our wireless network business in terms of scale, speed and reliability to meet the future demands of the business. With these objectives in mind the core transformation we undertook was readily justified in terms of the most efficient, scalable and future-proof outcome we could develop.

► **Operating efficiencies and savings aside, what kind of business advantages and consumer benefits does your new network bring?**

A single core network across all of our 2G and 3G access technologies delivers us substantial flexibility for customer migration and reuse of core capacity without the need to rebuild and migrate core capacity. It brings greatly simplified, “build once” product development across a single platform and related OSS/BSS systems, improved reliability from the most modern core network architecture and pooling as well as simplified configuration and software management across fewer network elements with improved ability to upgrade.

► **What are the factors behind Telstra’s market dominance in mobile broadband?**

Mobile data revenue as a percentage of mobile services revenue has almost doubled since the financial year ended 30 June 2006 to more than 30 percent this financial year. The main driver of mobile data growth has been the ongoing strength in wireless broadband supported by a wide range of data-enabled content and services with each of these underpinned by a nationwide, high-speed, single 850 frequency 3G network. Customers can reliably utilize 3G technology confident that there is always the coverage and capacity to provide 3G speeds and connectivity.

► **Many doubt that there is much growth in the market, blaming everything from**

*global economic slowdown to uncertainty over the consumer willingness to spend on data-based services. Is there any rationale for this pessimism?*

Overall, Telstra’s customer-centric and value-differentiated approach is so far combating these factors in our business and we are seeing minimal impact from the prevailing macroeconomic environments on our domestic business. Indeed the benefits in terms of reduced use of resources, transport and the efficiencies that flow from wirelessly enabling businesses is an opportunity for improved application of wireless technology in this economic environment.

► **What roles do content and services play in Telstra’s mobile broadband success?**

We consider content and integrated services an indispensable part of our equation for success. Integrated applications combined with Sensis, BigPond and FOXTEL content is now available on mobiles, and more is coming to leverage the combined speed and coverage as well as the enabling services we provide.

We have worked with handset manufacturers to bring to market an extensive range of devices and innovative “1-click 1-touch” access to the My Place menu, connecting consumers to entertainment, news, exclusive Telstra Mobile FOXTEL channels, television shows on BigPond TV, music, sports, games, e-mail, and Sensis content. From an enterprise perspective, our unmatched coverage and fast speeds can handle the wireless broadband requirements of the most bandwidth-hungry customers.

► **How important is it to have a converged, or business integrated, fixed- and mobile broadband offering?**

Integration and convergence are critical for Telstra as we look to further simplify a customer’s experience with all the products and services they get from us; it will unlock for them a whole new way of working, communicating and accessing the technology they buy from us. It’s the next step in user experience and something we firmly have our sights set on. ●

with a common core that could handle all 2G and 3G traffic.

In October 2006 Telstra launched Next G. Then began the process of making it the common core for the radio access networks operated as the GSM 2G Telstra mobile network, and the 2100MHz radio access network operated by the 3G1S joint venture. Simultaneously, rural subscribers were encouraged to convert from the CDMA network to the new 850MHz Next G network. This was especially the case when mobile broadband services using HSPA were introduced, making it possible for very fast mobile internet access to be provided to laptop computers equipped with plug-in modems. By April 2008 the transfer of rural subscribers was accomplished and the CDMA network was turned off.

**ARCHITECTURAL PAY-OFFS**

The consolidation of the 2G and 3G networks into a common core network is not the end of the Next G network’s core transformation. Telstra is forecasting a growth of approximately 45 percent in voice traffic and 680 percent in data traffic between 2008 and 2011. Recently Telstra announ-



## Creating a common mobile core

► **TELSTRA'S MOBILE** core network transformation has been achieved with the support of a number of innovative technologies:

To enable a common core mobile network Telstra deployed a Mobile Softswitch Solution (MSS) to flexibly handle all 3G and 2G traffic. This architecture physically and logically separates the network functions responsible for service management and control (control layer, MSC Server) and those for transport of service data (connectivity layer, Mobile Media Gateway). An MSC Server is the mobile core network node that controls circuit switched signalling relating to mobile voice calls. The common core functionality is equally supported in the Dual Access SGSN (Serving GPRS Support Node) packet core node. This creates a network that can dynamically handle changed end-user needs for voice and 2G/3G data services

The new generation MSC Servers, the MSC Server Blade Cluster, provides ultra-high capacity, supporting up to eight million subscribers with only two cabinets. It is based on new node architecture in which every "blade", or electronics board, inserted into a

cabinet, provides the means to upgrade the node capacity with up to 500,000 subscribers.

Network capacity can therefore be easily increased, and the footprint can be as little as 10 percent of that for existing servers, thereby reducing costs and energy consumption. Its power-efficient design will save Telstra an estimated 556MWh of energy and 584 tons of CO<sub>2</sub> over the next four years.

Telstra combined the MSC Server Blade Cluster with the MSC pool concept to dramatically increase network level redundancy for circuit-switched voice traffic. An MSC pool is an architecture that combines multiple MSCs (or MSC Servers) to act as one "Mega MSC Server". Nodes in a pool can share traffic load automatically, thus supporting peak traffic loads with fewer nodes, as well as handling planned and unplanned outages more easily. Similarly, nodes for packet data traffic, SGSNs, were also combined into a pool, resulting in improved capacity and redundancy. SGSN pools shorten response times, improving the quality of users' data sessions. Telstra was the first operator in the world to implement the pool features

for both 2G/3G MSC and SGSN.

With the "3G Direct Tunnel" feature the payload traffic bypasses the SGSN and connects the Gateway GPRS Support Node (GGSN) with the radio access network. The SGSN has now become a traffic signalling server. With only signalling traffic to the SGSNs, significant savings on both capital and operational expenses can be obtained by creating SGSN pools. This improved architecture is also expected to deliver Telstra an estimated reduction of 123MWh of energy and 129 tons of CO<sub>2</sub> emissions over the next four years.

Telstra is also moving to Ethernet transport instead of using SDH/ATM transport between radio network controllers and the core network. This will both simplify the system, and provide the higher-speed interfaces needed for HSPA+. In the longer term this strategy will allow the convergence of fixed and mobile traffic onto a common, high-capacity, cost-reduced transport network.

ATM > Asynchronous Transfer Mode  
CDMA > Code Division Multiple Access  
HSPA > High Speed Packet Access  
HSPA+ > HSPA Evolved  
SDH > Synchronous Digital Hierarchy

► ced the start of an HSPA+ trial supporting downlink speeds of up to 21Mbps.

To handle this traffic increase in the traditional core network architecture, Telstra would have had to invest heavily in more circuit- and packet-switched core network equipment. However, by making use of new mobile core network technologies, Telstra is able to meet the growth with a more resource-efficient network. Higher-capacity nodes and improved network design help to optimize the number of sites, resulting in reduced capital and operating expenditure, as well as decreased energy consumption and consequent CO<sub>2</sub> emissions.

For mobile voice, the main network changes made to support more efficient services involved the introduction of new generation mobile switching servers. Telstra's entire mobile voice core network, currently 18 Mobile Switching Centre (MSC) Servers across ten sites in five regions, will be replaced by new generation servers, with four "MSC Server Blade Cluster" nodes across four sites in two regions.

The eventual introduction of the updated management system for the new

nodes, and changes to operational practices, are expected to result in further operational cost savings. For example, the introduction of a new MSC Server, which today involves careful planning and orchestrated work to implement a new node, will in the future require the simple insertion of a new blade in the server cabinet and a minor configuration change to bring it into service.

For data services, the introduction of the "3G Direct Tunnel" feature provides a capacity increase to Telstra's mobile packet core network and is implemented in the existing network through software enhancements, with no additional hardware required. This is a first step towards a flat all-IP evolved packet core architecture allowing the network capacity to grow while lowering the cost of increasing network capacity.

**SIMPLIFIED AND MORE POWERFUL**

Architecturally, the transformed core network has fewer but more powerful nodes, at fewer sites, making the mobile core network much simpler, "flatter" and faster. As much as possible, nodes are IP devices interconnected by Ethernet transport on fast and cost-effective optical fiber cables. For network robustness, nodes are established in load-sharing "pools."

**The technical benefits of Telstra's new mobile core network are:**

- ▶ Ability to support HSPA+ (with speeds of up to 42Mbps)
- ▶ Reduced floor space requirement, energy consumption, and CO<sub>2</sub> emissions
- ▶ Enhanced robustness through increased use of redundancy and pools
- ▶ Easier introduction of new end-user features and operator features
- ▶ Progress towards an all-IP network.

**The commercial benefits of the new core are:**

- ▶ Meeting growth forecasts for voice and mobile broadband usage with lowered capital expenditure
- ▶ Reduced operating expenditure due to lower energy consumption and more efficient operations.

**The competitive benefits are:**

- ▶ Early ability to support faster user access speeds
- ▶ Reduced unit costs for voice and packet traffic
- ▶ Enhanced user performance and reliability, yielding improved customer satisfaction and lower support costs

- ▶ Enhanced reputation for the technical sophistication of the Next G network.

These last points deserve further comment. Historically Telstra, as the incumbent operator in Australia, has been viewed as the national telecommunications operator with the broadest range of services and greatest coverage. Telstra's marketing is founded on its claims of superior coverage, speed and capacity, enabling it to charge a premium price for services.

As a carrier that can claim to be among the most profitable of the worlds' telcos, Telstra is able to demonstrate the success of this approach. Having the world's most advanced mobile core network makes good business sense. ●

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