PSTN-to-NGN Evolution with the Alcatel 1000 S12 Media Gateway Controller
Introduction

The telecommunications market is changing. Although voice networks serve more than 1.2 billion subscribers worldwide, voice traffic continues to decline. At the same time, data traffic is growing at an exponential rate, and now exceeds voice traffic in many countries. This growth in data traffic, along with demand for new services, is driving the evolution of service providers’ network infrastructure toward packet-switched next generation networks (NGNs).

Alcatel sees three key market factors that will drive further growth of packetized voice in the market: broadband services and public switched telephone network (PSTN) evolution. This document focuses on the second of these, PSTN-to-NGN evolution.

Through this evolution, service providers can enrich their services portfolio with new advanced services, such as video telephony, games and entertainment, which complement voice service and deliver welcome new revenues quickly and cost effectively. At the same time, guaranteed feature continuity for subscribers will protect current voice revenues while smoothly introducing the NGN. More efficient NGN network structures will reduce the costs of traditional voice services while enabling the new voice services and multimedia applications that consumers demand.

The key to a successful PSTN-to-NGN evolution is careful planning, especially for those networks that have a state-of-the-art PSTN infrastructure. This is the case for Alcatel 1000 S12-based networks, which serve more than 218 million users worldwide and offer a rich set of features along with exceptional reliability, availability, performance and quality.

Alcatel provides these networks with a technology evolution that upgrades the Alcatel 1000 S12 switches so they become part of the NGN infrastructure. The transition process is simple and smooth. The migration is also cost effective and maintains the quality and services that consumers expect. This approach opens up new opportunities for service providers while safeguarding their current revenue streams and benefiting from existing networks and services.
Evolution Expectations

Service Providers’ Expectations
For service providers with a significant and profitable installed base, the PSTN-to-NGN evolution must maintain customer relationships and keep customers satisfied. The operator must also remain the customer’s primary focal point for existing and new services, acting as a service broker.

The evolution must offer a network infrastructure that supports any type of service while minimizing operating expenditures (OPEX) and capital expenditures (CAPEX). The evolution should also preserve existing investments in network infrastructure.

It is critical that the evolution to an NGN provide continuity of services and guarantee interworking between the PSTN and the new NGN. At the same time, service providers require a migration process with controlled cost and risk, and they need new revenues from new services.

Users’ Expectations
Users expect not only new services but also service continuity, including quality of service, for existing services from the PSTN and/or native Internet protocol (IP) terminations. Along with service continuity, they expect equipment continuity, safeguarding their investments in equipment that serves their current needs and adding new terminal types only for new services and functionality.

Ease of use and flexibility will be critical. Users will want to use multiple profiles and mobile profiles to access services from various locations and different types of terminals — anywhere and anytime. Easy and fast provisioning capabilities should enable users to manage service and access profiles according to their needs. Finally, users will demand minimal effort to manage business relationships, preferably one-stop shopping for all their communication service needs.

Alcatel’s PSTN Evolution Strategy
To satisfy both service providers and users, PSTN network evolution must maintain the current high levels of quality, reliability and availability. The network must remain robust and be protected. To ensure this protection and a smooth evolution, Alcatel believes the evolution must occur at all levels of the network: the access level, the control level and the services level.

For traditional telephone services, which are provided in the PSTN network via TDM circuit-based access and switching technology, the Alcatel 1000 S12 switches integrate the media and the control functionality. A natural evolution should provide these services to users connected to new generation access equipment, using their traditional terminals as well as new multimedia terminals with integrated voice functionality.

NGN Components
Creating an NGN involves three main components:
> The softswitch controls connectivity as well as delivery of services from application servers.
> The gateway converts packets and data streams to allow interworking between different types of networks.
> The network and service management suite enables service providers to manage their NGN.

Alcatel provides all of these NGN components. This document, however, concentrates on the softswitch, which enables Alcatel 1000 S12 switches to evolve into NGNs.

Alcatel 1000 S12 MGC
The Alcatel 1000 S12 Media Gateway Controller (MGC) Application is a software extension that is added to Alcatel 1000 S12 switches, to enable migration of Alcatel 1000 S12-based networks to NGNs. With the Alcatel 1000 S12 MGC, the flagship Alcatel 1000 S12 product range is ensured a secure yet flexible migration path toward an NGN.
PSTN-to-NGN Evolution with the Alcatel 1000 S12 MGC

As shown in Figure 1, adding the Alcatel 1000 S12 MGC to existing switches connects the TDM control world with the newer IP network infrastructure. This approach enables service providers to protect their existing revenue base and migrate their customers to higher-value new NGN services at their own discretion.

The Alcatel 1000 S12 MGC provides NGN subscribers with the full range of telephone services. As an upgrade of standard Alcatel 1000 S12 Class 4 and Class 5 functionality, the Alcatel 1000 S12 Switch with the Alcatel 1000 S12 MGC provides control of voice-over-packet access and trunking gateways via standard protocols (Megaco/H.248), while continuing to support legacy TDM trunk interfaces. The Alcatel 1000 S12 MGC uses the latest compact peripheral component interface (cPCI) technology to perform connection control, while service control remains in the Alcatel 1000 S12 Switch.

The Alcatel 1000 S12 MGC can be added to installed nodes or can be installed as a new stand-alone node. This carrier grade product delivers the scalability and interoperability required by voice service providers and is the only softswitch-based solution that guarantees continued full-featured voice support for the Alcatel 1000 S12 installed base.

Figure 1 - Alcatel 1000 S12 Connecting New Types of Subscribers
PSTN-to-NGN Evolution with the Alcatel 1000 S12 MGC

Network Overview of PSTN-to-NGN Evolution

The Alcatel 1000 S12 MGC can be used for network consolidation or, with new installations, for network growth. Each of these scenarios is discussed in separate application notes.

The Alcatel 1000 S12 MGC makes current Alcatel technology future safe by enabling conventional switches to become part of an NGN. Because it integrates fully into the existing operator infrastructure, this product provides a low-risk entry solution for first NGN deployments, while complementing the traditional TDM network. Existing and new subscribers enjoy the same features.

The flexibility of the Alcatel 1000 S12 MGC allows more accurate targeting of solutions. Service providers can provide either an NGN offering or a more traditional solution — whichever is more cost effective.

The Alcatel 1000 S12 MGC provides media resource functions such as announcement servers and conference bridges for NGN networks. This product also guarantees the provisioning of mandatory PSTN features such as lawful interception in NGN networks. Because the media resource functions are integrated in the Alcatel 1000 S12 switches, there is no need to duplicate and synchronize functionality between the PSTN and the NGN. Subscribers enjoy full feature continuity.

If separate media resource equipment is installed at the service provider’s network, the Alcatel 1000 S12 MGC can use it via a Megaco or SIP control.

Access Network Evolution

The evolution of PSTN access networks to NGN uses functional building blocks to upgrade the existing access to access gateways and to convert the Alcatel 1000 S12 switches to softswitches (see Figure 2). This strategy re-uses valuable access equipment in existing networks that are reliable and revenue generating.

Subscribers who today are connected to access nodes such as the Alcatel 1540 Litespan Multiservice Access Network or Alcatel 1000 S12 Remote Subscriber Units (RSUs) are served through V5.2 or proprietary interfaces that are controlled by the Alcatel 1000 S12 switches. Only the Alcatel 1000 S12 MGC, acting as a softswitch, can support the huge installed access infrastructure in both a PSTN and an NGN environment. Access evolution enables transparent delivery for RSU and V5.2 protocols, with no impact on existing RSU and V5.2 nodes. Migration from TDM to packet between the Alcatel 1000 S12 MGC and RSU or V5.2 nodes can occur in steps, according to a service provider’s planning and priorities.

The service provider can also choose to keep the TDM connection between the centralized access gateway (Alcatel 7510 C-AGW) and the RSU or V5.2 node. Or, the migration from TDM to packet may start at the RSU or V5.2 nodes using the decentralized access gateway (Alcatel 7515 MG) and the packet network up to the access node location. Subscribers are guaranteed full service and feature continuity. Finally, this building-block approach enables a migration scenario that starts with network consolidation on a TDM or packet base and can evolve to an NGN network serving narrowband and DSL lines.
Control Evolution

Subscribers demanding NGN-based capabilities and multimedia services are connected to the network via broadband interfaces. Their PSTN telephone services can be provided by the proven Alcatel 1000 S12 Switch or the Alcatel 1000 S12 MGC.

A service provider can evolve the network to an NGN infrastructure smoothly and with feature continuity, using the Alcatel 1000 S12 MGC as the control platform that helps maintain quality of service and existing revenue streams when moving from traditional PSTN to NGN for Class 4 and Class 5 services. The Alcatel 1000 S12 MGC also provides interworking between the PSTN and IP telephony, through ISUP/SIP (Session Initiation Protocol) interworking with the Alcatel 5020 Softswitch.

As shown in Figure 3, the Alcatel 1000 S12 MGC adds the following elements to a conventional Class 4 or Class 5 TDM switch:
- NGN service interface
- NGN signaling module
- NGN gateway control module

The Alcatel 1000 S12 MGC offers Class 4 applications a competitive alternative to transport voice traffic through IP data networks. For Class 5 applications, the Alcatel 1000 S12 MGC controls different types of access nodes and access gateways via standard Megaco/H.248 interfaces.

Services Evolution

PSTN networks offer IN services and telephony services. NGNs provide basic communication services, business centrex services, VIP services and multimedia services. Rather than keeping PSTN and NGN services dedicated to separate networks, service providers will want to share services across networks, in order to generate revenues and satisfy customers.

The Alcatel 1000 S12 MGC preserves existing reliable and revenue-generating services. In addition, an open SIP interface enables service providers to derive advanced services, such as personal or business voice applications, from any SIP application server. For multimedia terminals that are controlled by the Alcatel 5020 Softswitch or other softswitches, the Alcatel 1000 S12 MGC can also act as interconnection point between the PSTN and the multimedia world.

In the evolution of the telecom network, new terminals using new IP-based protocols, such as SIP and H.323, will be deployed. These terminals will be used for basic IP telephony (voice service only) as well as for advanced multimedia services.

Figure 4 shows an advanced network where the major transport capacity is provided by packet-based transport networks. The Alcatel 1000 S12 MGC acts as a center of control for many different access devices and supports the delivery of new and existing services, including ISUP-SIP interworking towards a multimedia server.

Services evolution enables operators to leverage the installed base and add NGN extensions, making the PSTN part of the NGN. New SIP-based application servers can be connected to the PSTN or to mixed access. In addition, local exchange (LEX) control is extended towards NGN-class terminals. Users benefit from more control and flexibility. They have improved self-provisioning capabilities and can access services from any terminal, anytime.
Conclusion
Migration from PSTN to NGN networks should be viewed as an evolution of existing networks that capitalizes on the installed base, optimizes the network, and introduces new services and applications. In this way, service providers get new services and revenues and a smooth migration path for minimal CAPEX and OPEX and minimal risk.

There is no single, universal migration scenario. Each migration depends on market conditions, specific network conditions, operator strategy and the available budget. One size does not fit all.

As much as possible, the migration process should be financed by revenue from new services and/or by the cost reductions associated with network optimization. In addition, interoperability with the existing installed base is key to success.

Alcatel’s evolution solutions using the Alcatel 1000 S12 MGC provide a full spectrum of migration options, to enable the most natural, graceful and economical evolutionary path from PSTN to NGN for each service provider. Network evolution is managed by the Alcatel 1300 CMC on all levels of the network: access, control and services. With minimal investment and maximum flexibility, the Alcatel 1000 S12 MGC is the safest track for investing in an evolution to NGN.