

ATIS Next Generation Network (NGN) Framework Part II: NGN Roadmap 2005

Issue 1.0
August 2005



ATIS is a technical planning and standards development organization that is committed to rapidly developing and promoting technical and operations standards for the communications and related information technologies industry worldwide using a pragmatic, flexible and open approach. Over 1,100 participants from more than 350 communications companies are active in ATIS' 22 industry committees, and its Incubator Solutions Program.

< <http://www.atis.org/> >

Next Generation Network (NGN), Part II: NGN Roadmap 2005

Is an ***ATIS Work Plan*** developed by the **Next Generation Network Focus Group** for the **TOPS COUNCIL**.

This document is a *work in progress* and subject to change.

Published by
Alliance for Telecommunications Industry Solutions
1200 G Street, NW, Suite 500
Washington, DC 20005

Copyright © 2005 by Alliance for Telecommunications Industry Solutions
All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher. For information contact ATIS at 202.628.6380. ATIS is online at < <http://www.atis.org/> >.

Printed in the United States of America.

Table of Contents

1	ATIS NGN ROADMAP 2005 OVERVIEW	4
2	HIGH-LEVEL REQUIREMENTS/GUIDING PRINCIPLES	4
3	THE ROADMAP CONCEPT	5
4	NETWORK SERVICE ENABLER DEPLOYMENT ROADMAP	7
5	DIMENSIONS OF NGN EVOLUTION	8
6	NGN ROADMAP CONSTRAINTS AND ASSUMPTIONS	9
6.1	DIFFERENTIATED ROADMAPS WITHIN THE NGN	10
6.2	NGN ROADMAP STARTING POINT ASSUMPTIONS	11
7	ATIS NGN NETWORK SERVICE ENABLERS AND DEPENDENCIES	13
8	CONCLUSIONS	23
9	REFERENCES	23
10	FOCUS GROUP MEMBERS	23
	FIGURE 1 NGN ROADMAP	6
	FIGURE 2 NGN SERVICE CAPABILITY DEPLOYMENT ROADMAP	7
	FIGURE 3 ILLUSTRATION OF NGN EVOLUTION IN DIFFERENT DIMENSIONS	8
	FIGURE 4 NGN ROADMAP FOR CARRIER INFRASTRUCTURE EVOLUTION	12
	FIGURE 5 NGN INTERCONNECTION VIA IP	13

Executive Summary

This document has been prepared as input on requirements for Next Generation Network (NGN) phasing to the global NGN standards initiatives. ATIS fully supports a consistent set of global NGN standards. The *ATIS Next Generation Network (NGN) Framework Part I: NGN Definitions, Requirements and Architecture, Issue 1.0, November 2004* contains a snapshot of NGN target objectives and features, for which phased implementation requirements will be developed. This ATIS NGN Framework Part II: NGN Roadmap 2005 builds on Part I and seeks to clarify the priorities for elements within these standards initiatives.

A key motivation for the NGN is to focus on the variety of new, value-added, IP-centric services and applications. A secondary motivation is to reduce CAPEX and OPEX through more efficient utilization of network resources to provide services (e.g. voice services).

The ATIS Next Generation Network Focus Group (NGN-FG) will continue to work with ATIS technical committees as well as external groups (e.g. TISPAN, 3GPP, ITU-T) to develop a consistent set of NGN specifications that meet the needs of ATIS members. To comply with unique North American requirements/standards, ATIS plans to share this ATIS NGN Roadmap 2005 document with all of its internal technical committees and other external groups where and when appropriate.

It should also be noted that NGN is a process (i.e. an ongoing activity), and it is expected that before industry reaches the full capabilities and services espoused by the current ATIS NGN Framework document, industry will have developed further insight into the evolving requirements of its customers. Accordingly, this NGN Roadmap document should therefore be seen as a work in progress and, as such, is likely to be periodically revisited and revised over time.

ATIS welcomes comments on this document.

1 ATIS NGN ROADMAP 2005 OVERVIEW

A simple roadmap is inadequate for the purpose of coordinating a myriad of activities by different parties within the industry. As such, this document begins with a discussion of the assumptions and constraints around the deployment of NGN.

The primary criterion for identifying an NGN Roadmap is the creation of an infrastructure that enables the flexible creation of new NGN services. Accordingly, the focus of this Roadmap will not be on determining exactly which new services will be successful, as this is seen as extremely risky to try to predict. Rather, the focus will be on identifying the underlying service enablers that will allow many potential new services to be introduced, and then letting the market decide which of these new services should succeed (This is essentially a “no regrets” approach to new services).

The NGN Roadmap also will not preclude the use of legacy infrastructure and the provision of legacy services as the various service providers evolve to an all-NGN network and service capability.

2 HIGH-LEVEL REQUIREMENTS/GUIDING PRINCIPLES

The ATIS NGN Roadmap is based on certain assumptions that can be used as guiding principles. Some of the key assumptions are documented here, as they may affect the service enablers initially identified in the ATIS NGN Framework document. The key NGN assumptions include:

- Networks will be multi-vendor. Existing networks tend to be single vendor within vertical silos. Since the NGN is intended to reduce these vertical silos, the NGN will have a different pattern of multi-vendor interoperability.
- Services must be able to traverse multiple providers’ networks.
- Interoperability between service provider networks must be based on defined interconnect specifications. Said specifications should include management and security, along with functional interoperability.
- Interfaces must be based on standards. Where proprietary interfaces are required initially, they will be transitioned to full standards-based interfaces as soon as practical.
- The NGN Roadmap must take into account the fact that timing will include standards, equipment built to the standards, deployment of equipment based on the standards, and end-user services built on the standards based equipment. There will be differences in the timing depending on which perspective is being considered.
- The NGN is based on IP. Existing network deployments, either standards-based or proprietary, will transition to the IP based NGN. Consideration will be given to identifying when these other technologies converge to the NGN.

- It is critical that Fraud Management capabilities be included in NGN functionalities identified in the document for initial deployment. Without these functionalities, the Fraud Management functions performed today (as in PSTN) cannot be performed for NGN services. This will be a direct and major revenue drain for NGN service providers.
- The assumption is that the "ATIS NGN Roadmap 2005" will focus on capabilities that could be deployed in the network, in standardized form, starting no later than Year End (YE) 2007. The focus group will consider the time required for standardization, development, and deployment, but will also recognize that much of this work is already underway in pre-standard variations. Based on these considerations, the target for standards being available to support the network capabilities identified as a priority is midyear 2006.

3 THE ROADMAP CONCEPT

The ATIS NGN Framework document provides a vision of NGN capabilities required or expected to be available at some future planning-horizon. It also provides for a large number of applications and network capabilities that significantly exceed those available today. As such, some phasing or prioritization of these network capabilities and services is clearly required, if the NGN vision is to be implemented in a coherent fashion. The notion of a roadmap has been suggested as a means to document this sequencing of network capabilities and services. A simple roadmap may be adequate within an individual organization, but may not be sufficient to coordinate multiple independent market participants. The NGN Roadmap is intended, to the extent possible, to describe an industry-generic approach to the deployment of NGN service enablers and underlying support capabilities. As such, it does not describe the current state and evolution plans of specific equipment vendors or service providers (i.e. the NGN Roadmap is forward-looking and vendor / service provider neutral).

Given that the NGN is a process (i.e. an ongoing activity), and it is expected that before industry reaches the capabilities and services espoused by the current ATIS NGN Framework document, industry service providers and vendors will have developed further insight into the evolving requirements of their customers. The NGN Framework document should therefore be seen as a moving target that may be periodically revisited over time.

The ATIS NGN Framework document does assume a starting point in the existing IP infrastructure of today. It also identifies a number of network service enablers and underlying network support capabilities that are expected to be incrementally implemented over time to achieve the vision of the NGN Framework. A key function of the NGN Roadmap is to identify those network service enablers and underlying network support capabilities that are of immediate interest.

Figure 1 (below) illustrates this general notion of evolution towards and beyond the ATIS NGN Framework document, starting from current IP network capabilities. The number of NGN phases required is yet to be determined. As a starting point, it is suggested that it may be convenient to think of the network service enablers and underlying support capabilities falling under "functionality (b)", as shown in Figure 1. In addition, the prioritization of

service enablers allows for the pulling forward of some items and the pushing back of others. Reasons to pull forward items include:

- Functionality is a prerequisite for other items
- Item is a clear “gap” with no substitutes currently available
- Significant perceived customer demand
- Some other body has already started and we need to respond to ensure ATIS requirements are considered

Reasons to push back an item might include:

- Significant uncertainty in regulatory treatment (we don’t know how it may be classified by the regulators)
- Significant uncertainty in the key concepts (we really, really don’t know what it is!)
- Requires immature technology
- Customer demand / value proposition is uncertain

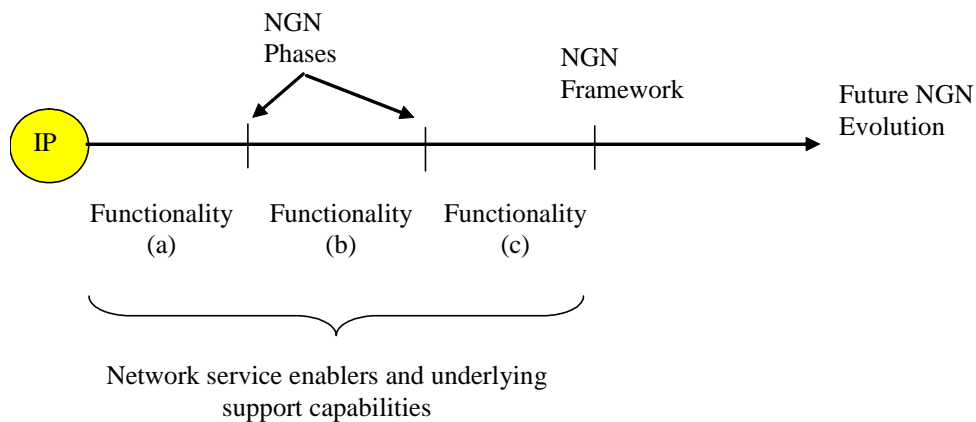


Figure 1 NGN Roadmap

This initial version of the ATIS NGN Roadmap is a standalone document in the sense that it does not make use or reference to other technology roadmap efforts that may be underway elsewhere within the industry. For example, other groups such as the ITU-T and ETSI TISPAN are also developing their views on the sequencing of features for the NGN. It is expected that future versions of the ATIS NGN Roadmap would be able to cross reference components of these other NGN related Roadmaps.

4 NETWORK SERVICE ENABLER DEPLOYMENT ROADMAP

While the previous sections considered the sequencing of network service enablers and underlying support capabilities over time, a different perspective arises from consideration of what it means to have a milestone on a roadmap, or alternatively a 'release' of NGN functionality. Figure 2, NGN Service Capability Deployment Roadmap, below illustrates this flow of new network service enablers into wider deployments. While from a standards generation perspective, the availabilities of specifications to define network service enablers are potentially within our scope this is but an early step in deployment. The ubiquitous availability of a network service enabler is a requirement in order to introduce new services that utilize that service enabler. Note that different types of activities are required to progress a network service enabler past these milestones. While pre-competitive research may be required to initially define a network service enabler, wide scale deployment and inter- service provider peering arrangements covering a wide variety of issues from technical interface specifications to business arrangements (such as settlements) will be required to achieve the later stages of deployment.

While the sequence of such milestones may be obvious, the time delays between the stages may be both significant and variable depending on the specific service enablers. It should be an objective to generally accelerate the rate of deployment of network service enablers. Further study will be required on process improvements that are required to achieve significant service deployment velocity.

The milestones in Figure 2, NGN Service Capability Deployment Roadmap may not be the only relevant milestones; others may also be possible.

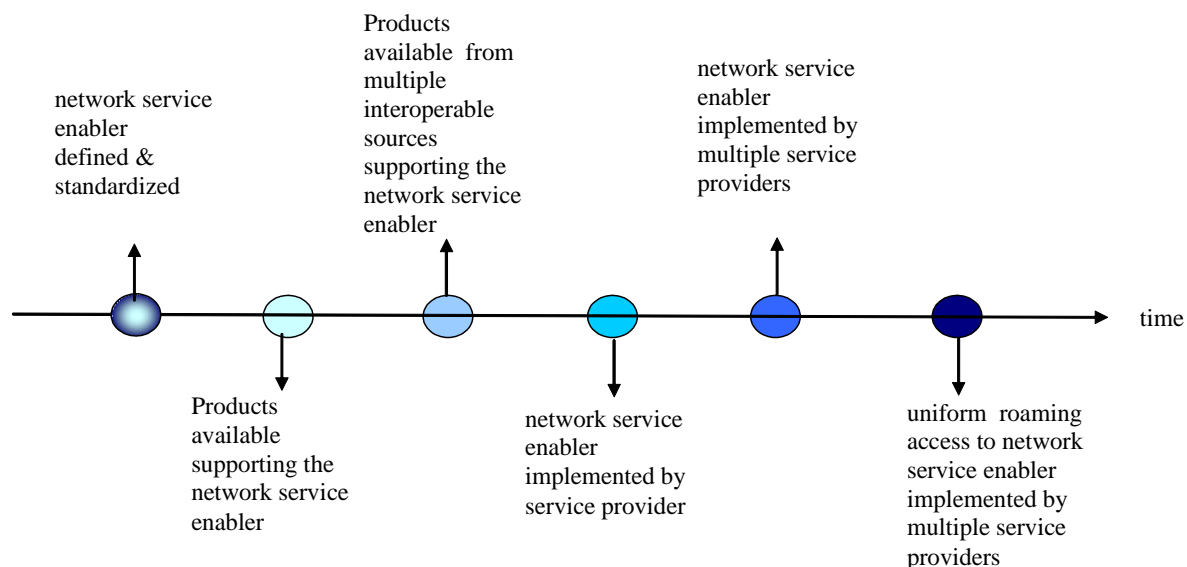


Figure 2 NGN Service Capability Deployment Roadmap

ATIS technical committees are primarily concerned with the development of the technical and operations standards necessary to enable the NGN. These standards define the network service enablers – the first step in Figure 2. Per the guidelines in Section 2, the objective is for the network service enablers to be defined and initial products available before YE 2007. Consideration also should be given to other actions required to identify, track and otherwise facilitate the completion of the other milestones in Figure 2. Such actions may include:

- Facilitation of network interoperability events and large-scale trials
- Elevating document status upon completion of various milestones
- Monitoring and reporting industry progress in completing these milestones

5 DIMENSIONS OF NGN EVOLUTION

NGN services can evolve from service capabilities in different dimensions (e.g., by supporting different traffic types or by including different network and third party service functionality).

Traffic type vs. NGN function	Transport	Storage	Processing	Display	Content	Other Axes
Data	NGN	→				Security
Text	↓					Privacy
Image						Charging
Video						Regulation
Voice						Fads
						New Applications
						New Media
						Social Demands

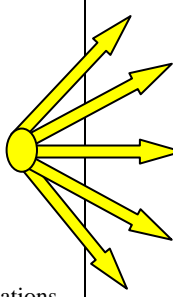


Figure 3 Illustration of NGN Evolution in Different Dimensions

Different service providers may choose to evolve their networks towards the NGN along different paths. Section 6.2 provides one example rationale for this based on differences in the starting point for the new infrastructure. Other rationales such as differences in the perceived market attractiveness or differences in expected operational efficiencies may also impact the sequencing of network functionality by service providers.

Besides the traditional axes of NGN evolution (shown in the table in Figure 3) there are other dynamic factors affecting the demands on the overall network infrastructure, such as market segment changes, emerging markets, new fads, universal access, enhanced client devices, new usage scenarios, different billing and charging methods, that do not fit into so

simple a two axis model. While the details of many of these factors are outside the scope of this document, their influences must be considered, and their capabilities need to be enabled.

6 NGN ROADMAP CONSTRAINTS AND ASSUMPTIONS

The NGN does not exist within a vacuum. There are a variety of assumptions made regarding both the technology feasibility and usage patterns desired or expected.

NGN objectives are related to the ubiquitous deployment of services that can be accessed anytime, anywhere. Such services are inevitably associated with the terminal devices that embody the service for the consumer. The terminal capabilities that are directly linked with the services running over the NGN are evolving within the time cycles and commercial constraints of the consumer electronics industry. Trends in semiconductor cost, processing power, storage density, and battery capacity impact the availability of functionality in terminals. Data storage trends also provide a significant impact on device capabilities. A suitable proxy may be to consider a secure digital flash memory card, which is currently available¹ in 2GB size, but is expected to be available in 16GB by 2009.

The improvements in access technologies whether modems, xDSL, fiber, or wireless, point to steadily increasing bandwidth availability for consumers. Since service usage expands to fill available bandwidth, the NGN Roadmap releases should have associated assumptions regarding the bandwidth availability.

Based on technology trends from analog modems, NGN users may expect the trend in residential access rates is an approximately 42% annual performance improvement (i.e. performance increases 4 times in 4 years²). The improvement in devices is strongly influenced by semiconductor technology trends such as Moore's law. The deployment of NGN infrastructure is also influenced by factors that do not follow Moore's law (e.g. fiber installation technologies and methods – backhoes do not scale with Moore's law). A better analogy for the infrastructure deployment is the decision to deploy a new semiconductor fabrication facility.

There are a variety of constraints that limit potential arrangements of functionality in the NGN Roadmap.

The amount of effort required to develop and deploy a specific set of functionality in a single release is a constraint that led to the request for this NGN Roadmap.

The NGN Roadmap is necessarily high level and abstract. The details of the network service enablers and underlying service capabilities are defined elsewhere by other committees.

¹ Schilit & Want, "Creating and Protecting Digital Worlds", IEEE Computer Magazine, Feb 2005, p.99-101

² Vanston et al, "Forecasts for Higher Bandwidth Services", Technology Futures Inc.

NGN Terminal Assumptions for YE 2007

In this timeframe it is assumed that commercially available consumer electronic devices will evolve to enable a portable NGN terminal to potentially include the following functionality:

- Removable flash memory ~2GB
- 3G Wireless Interface
- 802.11b/g WiFi Interface
- 802.16 WiMax interface
- At least 2"x2" color display with resolution at least QVGA (320 x 240)
- GPS Location
- Local accessory interfaces (Bluetooth/USB/Wireless USB etc.)
- Processing power to decode & display MPEG4 video
- Image acquisition (still & video)
- MP3 audio playback
 - Voice (telephony) I/O
- Miscellaneous other sensors (e.g. RFID, Biometric)
- Digital Rights Management support
- Processing power to support IPsec/IKE and other forms of cryptographically-based authentication and confidentiality mechanisms

Indeed, compared to a current voice terminal, the functionality is more likely to be limited by battery capacity than anything else.

6.1 *Differentiated Roadmaps WITHIN the NGN*

The arguments about the NGN Roadmap presented above treat the NGN as a monolithic entity. Alternative approaches to decompose some aspects of the NGN may permit more flexibility in the Roadmap elements.

One approach might be to consider the NGN in terms of interfaces (e.g. a User to Network Interface (UNI) and an Network to Network Interface (NNI)). This logical partitioning into multiple service provider networks may help to distinguish some areas for further work. For example, the NNI interfaces might imply significantly different settlement and peering arrangements than UNI interfaces.

Another approach may be to separate NGN Roadmaps in terms of horizontal layers that span the whole NGN. Protocol layers may be an example of this approach.

6.2 *NGN Roadmap Starting Point Assumptions*

The NGN is an evolution towards a more advanced networking infrastructure. The ATIS NGN Framework provides a rough outline of the NGN at some point in the future. For now, the NGN Framework is used as a “target,” although it must be realized that this target will evolve over time. The NGN Roadmap should, consequently, identify a feasible path of network evolution leading to the target. A necessary precondition, then, is to define the starting point for the Roadmap. North American telecommunications service providers have business interests in a number of infrastructures that may be used as a starting point in evolving towards the NGN. Rather than describing a specific service provider’s current network infrastructures, the NGN Roadmap identifies them as belonging to one of the following general infrastructure categories:

- Wireline PSTN infrastructure
- Wireless PSTN Infrastructure
- IP infrastructure

Not all service providers have all three infrastructure types, but certainly there are service providers with multiple infrastructures. The NGN Roadmap can be considered as the phased convergence of the services offered over these infrastructures. The details of these existing service provider’s infrastructures are neither uniform across service providers nor completely static. The NGN Roadmap for individual service providers will be impacted by their choice of starting point. A service provider starting from an infrastructure dedicated to support of voice services may look to early voice service operation across an NGN. A service provider starting from an IP infrastructure may look to early support of other services (e.g. email or presence, or video).

The evolution of wireless infrastructure based on IMS is defined by 3GPP.

The evolution of DSL infrastructure to support IP services is defined by the DSL Forum.

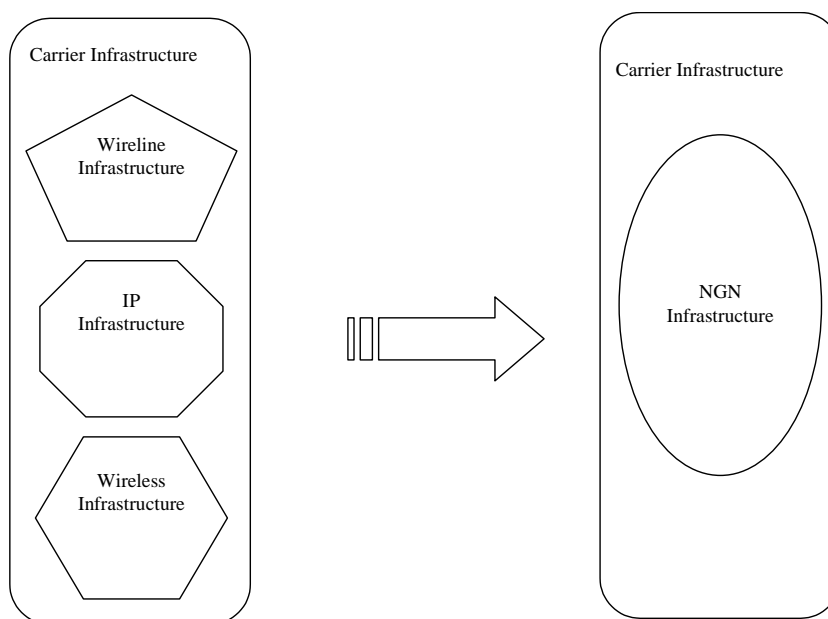


Figure 4 NGN Roadmap for Carrier Infrastructure Evolution

For practical reasons, NGN evolution cannot depend on synchronized deployment across service providers. This automatically leads to the assertion that various service provider infrastructures will exist at different evolutionary stages. Interoperability in such an environment is obviously constrained by the intersection of available services. Appropriate interworking arrangements between the existing infrastructures and the NGN are required.

While service providers may make a number of evolutionary steps within their networks, it is really in the area of interconnection where standardization becomes important. From this context, the IP communication infrastructure is the essential element of the NGN to enable NGN interconnection, interconnection between the current carrier infrastructures, and the NGN of the future.

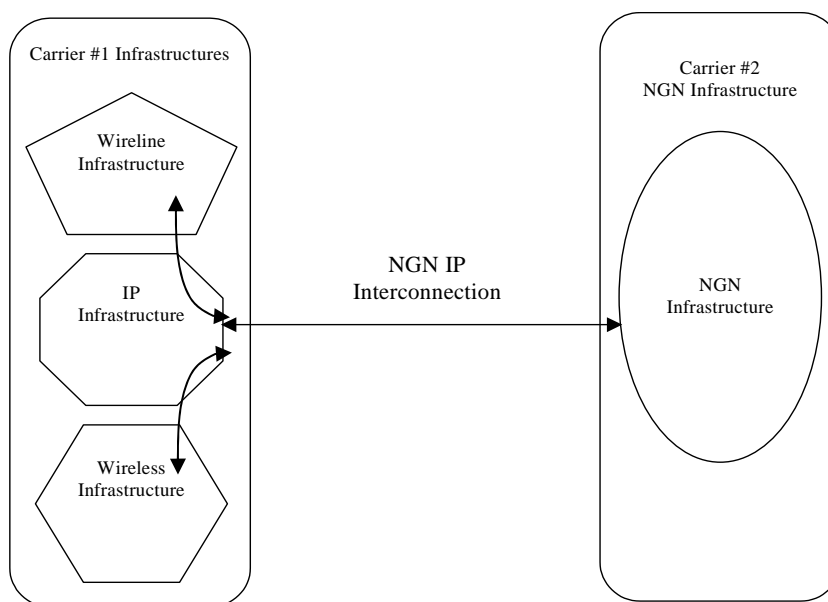


Figure 5 NGN Interconnection via IP

For all service providers, the network evolution planning is a process of balancing the protection of existing investments with the potential gains from new investments. Incremental, piecemeal evolution towards the NGN seems more realistic than large-scale cutover.

7 ATIS NGN NETWORK SERVICE ENABLERS AND DEPENDENCIES

The following list of service enablers has been proposed as a starting point for the NGN Roadmap, based on their identification in the ATIS NGN Framework document and subsequent Roadmap discussions. These service enablers have been prioritized and grouped to identify the minimum set of capabilities necessary to create a near-term environment for flexible service creation. While the focus and scope of the ATIS NGN Framework document is the cooperative evolution to an all-IP NGN network and service delivery environment, one of the major considerations is the incremental evolution of existing infrastructure and services, in order to minimize inefficient early obsolescence of existing legacy investment. The document also recognizes the need to maintain continuity with end users' expectations for their quality of experience (QoE), which has evolved, along with the capabilities of the networks, over more than a century of traditional telephony experience.

Functions required includes functions at

- (i) Physical Layer / Media
- (ii) Access Network Behavior
- (iii) Service/Control Primitives
- (iv) Applications & Services

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
1	Unified user profile		Assumes current IMS specifications are accepted for Release 1, Combined user profile that consolidates a number of accounts and devices to provide consistent services. This capability is included in IMS, and may provide the minimum required functionality for Release 1.	2.4.6	1	This enables service capabilities to be accessed from a range of locations and devices. Beyond this, many of the services enabled are in theory possible by manually provisioning the same information on multiple devices. However in practice this is awkward, and will not be done. Therefore in practice, the unified user profile enables (i.e. makes practical) any services that link together separate devices or appearances of a user (e.g. logging in from another user's soft client).
2	Security:	(a) Single sign on (common authentication and authorization)	(i) Access network and sign on from any device,	2.5.2, 2.5.2.1-2.5.2.7	1	
			(ii) Sign on from another provider's network		1	Key enabler for the unified user profile.
			(iii) Sign on for access network and for various services		1	
		(b) Separation of media from signaling in network.	User data is separated from NGN signaling information at the edge of the network.		1	Separation of media from signaling in network does not enable new services, but makes them more reliable and secure.
			Within the NGN infrastructure, NGN Signaling, Control & mgmt are carried on a separate physical or virtual network where feasible. Transport signaling may be an exception.		1	

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
		(c) Inter-provider security (FW/Border Element, etc.).	Provides security at the inter-provider boundary. This includes NGN signaling, control, management and data. Attack mitigation and prevention	2.1.1, 2.5.2	1	
		(d) encryption of signaling for integrity and privacy	(i) Signaling is signed & encrypted between subscriber and network signaling elements..	2.5.2.2, 2.5.2.3	1	
			(ii) Signaling is signed & encrypted between signaling elements within the network.		1	
			(iii) Signaling is signed & encrypted between network providers.		1	
			(iv) End-to-end signaling encrypted between subscribers.		3	
		(e) non-repudiation services	For example network added time stamp or call log	2.5.2.4	1	
		(f) Attack mitigation and prevention	(i) Protection of network users from attacks against them or detection and mitigation of such attacks. For example, Remote Triggered Black Holes.	2.5.2.7	1	
			(ii) Prevention of network users launching attacks against others. For example, use of rate-limiting or source IP address spoofing or making ANI-spoofed calls.		1	
			(iii) Detection and traceback of attacks (Tracing attacks back to the sources). This can also include network forensics. This could be seen as a subset of (a).		1	

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
3	Decoupling of services from access technology.		(a) Services defined and delivered independent of the access technology, although not all services will work completely with all access technologies.	2.6.2.2, 2.1.6, 2.1.10	1	Enables services to be defined and delivered independent of a specific "vertical" network function.
			(b) Optimization when there is more than one access technology available. This optimization could be based on many factors (e.g., technology, business relationships, etc), depending on what matters to the user or network (BW, cost, delay, etc.). The assumption here is that the access network will adapt to the NGN core to provide any optimization.		3	
			(c) Intelligence is required (possibly in the network) to determine the most sensible thing to do when a given access technology or user device does not fully support the service capabilities. (This second point may be phase 2...)		4	
4	Integrated management of all services, users and networks to reduce cost of management.		Must ensure that management is focused on the network infrastructure and service enablers, rather than the specific services. This is clearly the target, but if the initial focus is new services (rather than cost reduction) then this is probably for a subsequent release.	2.5.1, 2.6.2, 2.6.2.3	3	

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
5	Scaleable management and operation tools that can keep up the pace of service introduction.		The NGN Business Model driven requirements include the ability to "flexibly define, prototype, launch, and modify new services." The need for flexibility resulted from the time required to make changes in the current environment. Developing a rapid, flexible service creation environment necessitates the same flexibility in the FCAPS systems so that the services can be deployed to generate revenue.	2.5.1, 2.6.2	2	Section 2.6.2 (Implications for Service Providers) states that "From a service development and delivery point of view, a capability needs to be developed to flexibly define, prototype, launch, and modify new services. Moreover, another capability is needed to orchestrate a complex end-to-end service delivery chain, including third parties." This rapid delivery of services necessitates flexible OSS/BSS systems to provide the required FCAPS.
6	Presence		Presence is a set of attributes characterizing the current properties (e.g., status, location, etc.) of an entity.	2.4.2	1	Presence information can be used by a variety of other applications. For example, a find me follow me application could use presence to remove an unregistered cell phone from the called devices.
7	Admission control based on service requirements, capacity, etc.		Session admission control only admits the sessions that can achieve some defined level of QoS and security control.	2.4.15	1	This function enables the reliable delivery of real time services. There may also be applications that need relatively better services than other applications, perhaps just for a defined period of time (i.e. differentiated services).
8	Service transparency		(a) The NGN should continue to offer backwards compatibility to best effort Internet applications to gain services from their home provider.	2.1.8	1	
			(b) Allow users the ability to their subscribed services from any access network and/or through any core NGN network.		1	

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
9	QoS	(a) Intra-provider QoS		2.4.1, 2.4.15, 2.5.3, 2.5.7, 2.5.8	1	VoIP, multimedia conferencing, IPTV, network gaming
		(b) Inter-provider QoS			1	
		(c) Default QoS capabilities at sign on	Qos should depend on the services subscribed to.		1	
		d) end-to-end QoS			1	
		(e) on-demand QoS	Arbitrary QoS services on-demand by the user		2	
		(f) comprehensive QoS, encompassing reliability/availability	Note: the network must be able to grant the appropriate QoS, and change the granted QoS when appropriate		1	
10	Settlement (Accounting)		The network will provide accounting functions to support various charging and billing scenarios. Examples would be fixed rate and usage based for all applications and services. Includes both end user and inter carrier and other service providers. Include intelligent roaming and charging scenarios.	2.5.4	1	
11	OAM		systems need to be modified on the same time scale as new services can be implemented	2.6.2.3, 2.5.1	1	

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
12	Multicast	one-to-many	Multicast sessions and unicast session need to be supported with common authentication and authorization mechanisms. Multicast and unicast sessions claiming QoS controlled resources should use a common integrated admission control mechanism.	2.4.7	1	
		many-to-many	(e.g. multiplayer gaming, chat group)		4	
		many-to-one	(e.g. data collection, any cast resource discovery).		4	
13	Address Resolution		ENUM, Standardization essentially complete awaiting policy and implementation		1	
14	Network stored user content & PIM		Network storage of contacts (such as names, phone numbers, and addresses), calendar, tasks, account information, and content rights.	2.4.11	3	Synchronization of personal information across devices. (WiFi handset, PC, Cellular phone) Availability of this information to applications to provide a personalized user experience.
15	Commercial Location-Based Services	(a) network based location	Identification, Storage, and Access of end point location data. with appropriate measures to ensure user privacy within the limits of regulation.	2.4.10	3	This information is applicable to a variety of applications. Emergency services can use the information to locate the person in need. Advertisers will want the information to guide potential customers to nearby shops or restaurants. Users will want directions to required services or destinations.
		(b) device based location	(i) No network validation		1	
			(ii) Network validation		2	

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
16	Scoped service discovery (including directories as required to support the efficient discovery). This could also include discovery of content via a mechanism such as an electronic programming guide.	(a) Network elements service discovery	Service discovery system provides a mechanism to discover user-interest services, device-interest services and network (local) information scoped by a number of criteria such as location, cost, etc. Service discovery is part of the user profile life cycle that includes discovery, enrollment, retrieval, change notification and change uploads.	2.4.13	3	
		(b) End-user device service discovery			3	
17	DRM		Digital rights management is a systematic approach to managing copyright for digital content.	2.4.14	1	
			DRM is an application layer enabler and should not affect the NGN transport.			
			The NGN may provide authentication and location information to a DRM application per previously established business agreements.			

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
18	Sensor / SCADA / RFID		Bar codes, sensors, RFID, biometrics and others. This would include services such as home alarm monitoring. (This included machine-to-machine communication aspects, as well as assumptions about terminal capabilities to support the various sensors. Security aspects will be critical for this item.)	2.3.6	5	
19	User control of profile / services		allows the user to configure a certain part of the user profile to control services; configurable user service information and preferences include, for example, current registration information, roaming information, call forwarding information, instant messaging service information, and voice mail box options; user profile may span across multiple devices and be shared across multiple applications	2.6.2.1, 2.4.6	1	single sign on, location based services, 3rd party applications, mobility, nomadicity
20	Service Gateway Functions (how to locate and route to them, etc.)		allows telecom services (e.g., telephony, and fax) to be provided across networks of different technologies or operators	2.4.5	5	IP trunking, PC to phone, phone to PC, IP fax relay
21	Media Resource Functions		media resource functions for playing announcements, collecting inband signaling tones, speech recognition, speech synthesis, text to speech conversion, transcoding (audio & video), conferencing (audio & video), etc.	2.4.4	1	conferencing, pre-paid or calling card calling, voice activated dialing, unified messaging, network gaming
22	Content delivery		getting info to the customer via streaming, transfer, etc.....Supporting control and protocols to support a number of applications and services. This could include caching of web content, NGN		2	E.g. combining presence list on placeware with conference call showing who is on the call, and who is speaking...

Ref #	Category	Sub-category	Expanded definition	Framework Ref	SP Priority *	Functions/ service enabled
			support for peer-to-peer protocols, or distribution of licensed content.			
23a	Group Mgt		Group Management: List management per Subscriber and per Group for items such as: Email lists, Call accept lists (Black Lists, Grey Lists, White lists), Talk groups, Distribution Lists.		1	
23b	Session Control		Session Control or Floor Control for items such as: Push to Talk, Multimedia conferencing, Keyboard Chat.	2.4.15	2	
24	3rd party billing events (e.g. using cell phone to pay for drink from vending machine)		The support for a variety of commercial arrangements for settlement of transactions between service providers based on a variety of metrics (e.g. volume, time) and settlement models (e.g. sender pays, receiver pays). In the context of 3GPP functional model, a charging function generates charging records (CDR) which are then used to create billing records.	2.5.4	2	

Column Descriptions:

Ref#: Assigned numeric reference to each network capability.

Category: Specifies the network capability, as defined in the ATIS NGN Framework, Part I: NGN Definitions, Requirements, and Architecture

Sub-category: Identifies the issues specified under each network capability.

Framework Ref.: Section containing the network capability in the ATIS NGN Framework, Part I document for additional information.

*SP: Service Provider ranking of the network capability in order of importance from 1 -5; **1 = Highest ranking.**

Functions/Service Enabled: Brief description of network services or functions enabled by the network capability.

8 CONCLUSIONS

This document has been prepared as input to the global NGN standards initiatives. ATIS fully supports a consistent set of global NGN standards. A standards gap analysis is currently underway in the ATIS NGN-FG. This will be input into the standards process. The NGN Roadmap 2005 document contains a snapshot of NGN phased implementation requirements as ATIS understands them in 2005.

ATIS will continue to work with the ATIS technical committees as well as external groups such as TISPAN, 3GPP and ITU-T to develop a consistent set of NGN standards that meet the needs of ATIS members. To comply with unique North American requirements / standards, ATIS plans to share with all internal technical committees and others where appropriate.

ATIS welcomes comments on this document.

9 REFERENCES

- [1] ATIS NGN Framework Part I: NGN Definitions, Requirements and Architecture

10 FOCUS GROUP MEMBERS

Company	Name
Lucent Technologies	Bill O'Shea, Leader
Acterna	Jay Stewart
ADC Wireline Business Unit	Dieter Nattkemper
ADTRAN	Kevin Schneider
ADTRAN	David Williams
ADTRAN	Marc Kimpe, Ph.D.
Agilent	Larry Holmberg
Alcatel	Frederick H. Skoog
Alcatel	Gary Hanson
Alcatel	Ken Biholar
Alcatel	John Kaippallimalil
Alcatel North America	Larry O'Pella
AT&T Labs	Charles Dvorak
BellSouth	Steven Wright
BellSouth	Andrew Vernon
BT Group	Keith Dickerson
BT Group	Graham Travers
Ciena Corporation	Andrew Deczky
Ciena Corporation	Dr. Rajender Razdan
Cisco	Chip Sharp
Cisco	Monique Morrow
Cisco	Art Reilly

Company	Name
Cisco	Dave Meyer
Ericsson, Inc.	Asok Chatterjee
Ericsson, Inc.	Stephen Hayes
Ericsson, Inc.	Susana Sabater
Harris Microwave Communications Division	Carl Day
Harris Corporation	Jerry Sonnenberg
HP	Steve Mills
HP	Lionel Lapras
HP	Mark Gullett
HP	Marc Brandt
HP	Alain Guigui
Intel	Walt Brown
Intrado	Ray Paddock
Intrado	Mike Nelson
Intrado	Larry Ciesla
Leapstone Systems, Inc.	Matt Milford
Leapstone Systems, Inc.	Chris Daniel
Lucent Technologies, Inc.	Hui-Lan Lu
Lucent Technologies, Inc.	Stu Goldman
Lucent Technologies, Inc.	William (Bill) J. Bushnell
Net.com	Craig Forbes

Company	Name
Net.com	Colin Mead
Net.com	Simon Dredge
Nokia	Ed Ehrlich
Nokia	Curt Wong
Nortel Networks	Jim McEachern
Nortel Networks	Ron Ryan
Qwest	Mike Fargano
Qwest	Joe Huggins
Qwest	Balan Nair
Qwest	Andrew White
Qwest	Glenn Morrow
Samsung	Dr. Howon Choe
SBC	Jeff Johnson
SBC Laboratories	Steve Mueller
SBC Laboratories	Bernard Ku

Company	Name
SBC Laboratories	Robert Hall
SBC TRI	Chuck Bailey
Siemens ICN	Rudolf Brandner
Siemens ICN	David Francisco
Siemens ICN	Derek Underwood
Siemens ICN	Dr. Klaus Pulverer
Sprint	Dale Baldwin
Telcordia Technologies	Dave Sincoskie
Telcordia Technologies	Dr. Tao Zhang
Telcordia Technologies	Fuchun Joe Lin
Telcordia Technologies	John-Luc Bakker
Telcordia Technologies	John Wullert
T-Mobile	Gary Jones
Verisign	Tony Rutkowski
Verizon	Bhumip Khasnabish

- End of NGN Roadmap 2005 -