ATIS—A Critical Force in Shaping 5G to Meet Service Providers' Market Needs

Abstract

From the development of an overarching vision to the delivery of specific requirements, ATIS plays a pivotal role in the communications industry's advancement of the concept, objectives and capabilities for 5G systems. In 2015, ATIS produced the white paper "*5G Reimagined: A North American Perspective*," which defines a vision of 5G incorporating both incremental and innovative aspects of the 5G network—how 5G will evolve from the current network and what its potential will be. Both incremental and innovative perspectives are crucially important in terms of positioning network operators to leverage 5G to advance their business models. In 2016, ATIS is fast-tracking its work to develop detailed 5G specifications. ATIS is defining the industry requirements that will direct 5G's eventual technical capabilities and provide the basis for all subsequent 5G standardization.

How will the new 5G radio access technologies work? How will the 5G transition take place? What will Quality of Experience mean in a future in which communications technology is even more deeply embedded into the social fabric than it is today? This briefing provides insight into these questions, and covers some of the areas in which ATIS is working to ensure 5G's success.

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In 2016, ATIS is fast-tracking its work to develop detailed 5G specifications. ATIS is defining the industry requirements that will direct 5G's eventual technical capabilities and provide the basis for all subsequent 5G standardization. Building on the insights presented in *5G Reimagined,* these requirements will give the direction to 5G standards that takes into account the North American market's particular needs and leverages its technical prowess and orientation toward innovative services and service delivery. ATIS' goal is to ensure these requirements equip 5G to support user expectations as well as network operators' commercial success.

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5G Requirements

ATIS' first priority is to ensure 5G standards fulfil the requirements of our members. Data consumption on smartphones continues to increase – both in terms of volume and speed. Keeping up with demand for mobile broadband while sustaining the economics of networks is a critical 5G requirement, and this comes through clearly in our use cases.

One transition that we expect to be fully realized in 5G is that devices will no longer be alternately connected to one radio access or another. The new normal is for mobile broadband devices to sustain multiple radio connections simultaneously using a variety of licensed and unlicensed technologies. ATIS is defining requirements to support this scenario and optimize the user experience and system efficiency. We recognize that a major attribute of future wireless networks will be the ability to distribute different classes of user traffic to available connections in the best way.

Alongside mobile broadband, the Internet of Things (IoT) market continues to grow. Gartner has predicted that by 2020 the number of IoT devices will outnumber the human population by a factor of 3. This demands a network that is capable of simultaneously optimizing for the very different characteristics of smartphones and IoT devices. ATIS is defining requirements that support the IoT as an intrinsic feature

of 5G. It is also developing concepts such as network slicing that can allow a shared infrastructure to operate in different configurations to optimize for different user behaviors.

North America has led the international work to define standards for commercial cellular systems that are capable of meeting the needs of first responders and other critical communication users. We anticipate that the extended capabilities of 5G will bring to first responders new possibilities that will help save lives and improve security while reducing costs. As a long-term leader in creating the next-generation communications advances that the market demands, ATIS is working to ensure that 5G is prepared for the full suite of critical communications applications.

5G Transition

ATIS members are excited about 5G's potential, but in a competitive environment the deployment of good technology must be driven by a good business case. North American operators are investing heavily in 4G to satisfy user demand. Even as 5G specifications are developed a process of continuous improvement means that 4G is — and will remain — an important technology. Unlike some other regions, we do not expect that North America will have nationally directed targets for early deployment of 5G. Instead 5G will be rolled out in response to business imperatives.

This context means that ATIS members are looking for 5G systems that can be deployed alongside, and take advantage of, a widespread and robust 4G network. An evolving view in the industry is that 5G's first phase may be a fairly standalone system optimized to demonstrate the potential of new 5G Radio Access Technologies (RATs). ATIS' focus is the phase beyond this where 4G and 5G accesses can be integrated in to the same network and combined to best serve users.

ATIS continues to strive to define a coherent network evolution as part of 5G. This means that as well as utilizing new radio access technologies 5G defines a new optimized network core which is capable of supporting multiple access technologies across a wide range of usage scenarios including massive mobile broadband and pervasive IoT services. We believe that this concept is essential to meeting ATIS members' long-term needs by improving the economics of service delivery to keep networks viable.

A wide base of ATIS members has united through the ATIS 5G Initiative to work on 5G requirements and transition efforts. The Initiative has broad membership and will continue to provide a unique focus on 5G and manage ATIS' overall engagement in the topic. We are also bringing in the deep expertise of our ATIS Wireless Technologies and Systems Committee (WTSC), which has played a key role in developing and evolving previous cellular generations.

Much of the current focus on 5G is directed towards the important topic of new radio access technologies, but the ATIS vision for 5G goes beyond this. 5G is preparing the industry for a future world where communications technology is even more deeply embedded in the social fabric that it is today. Our vision of 5G aims to address the implications of this for future networks.

In *5G Reimagined* ATIS developed a number of breakthrough use cases where new techniques and technology were applied to change the business models and user experience in 5G networks. Following a prioritization exercise we have determined to initially focus on Quality of Experience as a differentiating factor in 5G. This concept encompasses the full range of technical and service factors that impact the quality of experience perceived by the user. The need to measure and manage quality of experience is already well recognized by companies that deliver services over the Internet. We aim to broaden its application to all types of communications services.

The ATIS 5G Initiative has started a study on quality of experience which will examine how to:

- Measure the quality of experience
- Use big data techniques to understand the data
- Take actions according to insights delivered
- Protect user confidentiality and privacy
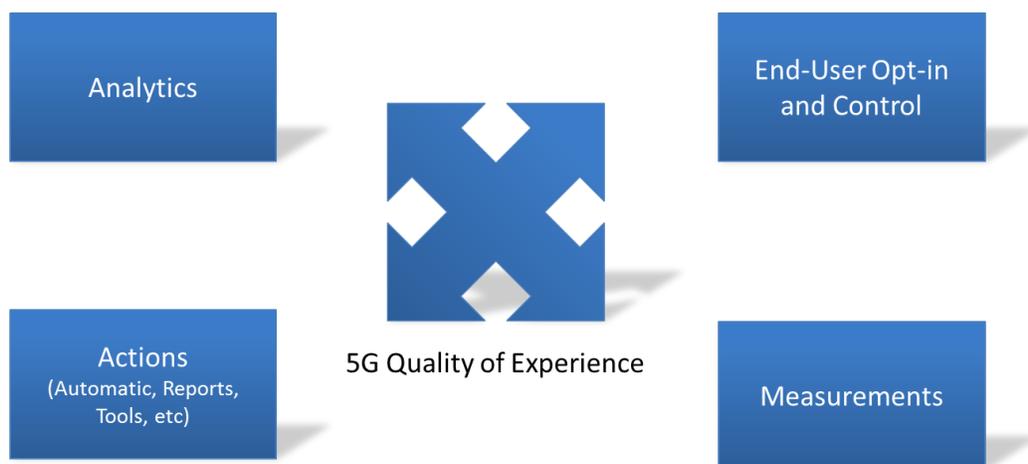
Outline for 5G Quality of Experience Technology Ecosystem

With these components ATIS will create a framework that can support an open communications industry ecosystem directed towards managing the users' quality of experience to better tailor services to their needs and to build better ways for network operators to benefit from value that they provide to users.

As with any eagerly awaited technology, the danger with 5G is over-inflated expectations followed by disappointment in the market place. ATIS' 5G Initiative and its WTSC we are working hard to define 5G so that it provides a platform that can truly address our members' future needs while still leveraging existing investments. To do this we are defining 5G requirements that recognize the full breadth of service requirements that will be encountered in the 5G timeframe and that also incorporate proper consideration for transition scenarios and system cost-effectiveness. 5G needs to be more than just "bigger, faster and stronger" in today's terms. It also needs to anticipate the continuous reshaping of the communications industry. Our work on aspects like critical communications and user quality of experience will take 5G beyond simply being a "fat pipe" for Internet content—and ensure it realizes its potential.