New demands on network architecture

Providing both control and agility simultaneously is the greatest challenge that faces those attempting to design future networks that meet the demands of urban life.

The characteristics of the browsing and downloading era in fixed networks have little to do with the future of broadband connectivity, in urban areas in particular.

Networks need to deliver information whenever and wherever it is needed. But where are the creative places that need connectivity in a city? Understanding how creativity and collaboration work together is necessary for understanding how the urban communication network needs to evolve.

Looking ahead, it is clear that connectivity innovations, from a technology as well as a business-model perspective, must materialize to allow creativity to thrive. As key enablers of the Networked Society, operators should extend their focus from total cost of ownership and networks as a liability into total value of ownership, where the network is the primary asset for maximized value creation.

To make this happen, networks must develop to deliver scalability, smartness and superior performance.

Matching urban creativity

Different growth factors – ranging from traffic growth to growth in the number of connections or devices to a changing traffic mix – have different effects on the network. The network needs to scale in three different dimensions: capacity, devices and signaling.

Capacity scale: Traffic growth affects the capacity of routers, gateways, transport and access nodes, and security gateways, but typically does not directly impact operational support or customer-care systems. The most important scaling factor for the radio network will continue to be the provision of bit-rate coverage. One way to address this is by using heterogeneous networks, in which radio base stations transmitting at different power levels, or even using different access technologies, share the same radio spectrum.

Devices scale: Capacity scale must be matched by corresponding scalability in control systems, to address and track connected devices. Bulk and self-service provisioning will be necessary to handle the many connected devices that are likely to be associated with service provider partners. IPv6 will be introduced to secure sufficient addressing space.

Signaling scale: Smartphones, tablets and a large number of new devices generate significantly more control traffic per user than traditional voice services. Networks must scale control planes to respond to active application requests.

Beyond “one-size fits all”

So far, broadband has primarily been associated with the attributes of dumb pipes and low prices. With the proliferation of broadband almost everywhere and built into nearly everything, subscription types must be developed to suit the individual.

Individual users make individual choices. Applications, devices and services demand a smarter network that can support services in more advanced ways, not only technically but also with proven business models for the new versions.

The introduction of smartphones and tablets has made it inevitable that new forms of connectivity will be introduced to improve end-user experiences. We are reaching the end of the era in which best-effort internet with the same characteristics and equal priority for all services is the one and only connectivity option. Differentiated connectivity represents a significant revenue source for the content or service provider, to the delight of users. But charging only for bits and bytes is like a restaurant applying a fixed unit price per calorie for all dishes.

The concept of differentiated connectivity means that the network supports the individual needs of the user. This can be explained with a road metaphor. Bike lanes are suitable for low-traffic applications such as machine-to-machine; guaranteed priority bus or taxi lanes for situations in which the operator bundles service and connectivity; and a wide range of differentiated lanes for internet traffic that is prioritized and optimized according to applications, quality, capacity, speed and so on. However, best-effort subscriptions will continue to be the type of
subscription on which the mass market is based.

When can premium connectivity be implemented? The network technology exists on the node level today; the bulk of the implementation work will relate to aligning business models in the industry and streamlining the end-to-end engineering for optimal performance.

SUPERIOR PERFORMANCE

The modern vision of creativity in the form of a social process rather than an individual one increases the demand for very high-performance connectivity and networks. Networks must support creativity in various forms – for example, interactivity and real-time video collaboration.

A number of different network-performance attributes can be singled out as critical to urban creativity. High speed and capacity are a given; high levels of security, quality and coverage are increasingly important. Low latency for gaming, low latency variation for video communication and low network downtime as more mission-critical services become connected are other examples. “Rush hour” will soon extend to 24 hours of each day.

The only way to secure superior performance is via a holistic approach in which perceived end-user service quality is in focus. A range of activities must be considered when targeting superior performance. These include overall system and network design, as well as product performance, the optimization of total system performance, and the definition of the service-assurance framework, as well as securing efficient coverage and capacity build-out.

CONTROL AND AGILITY

The challenge in designing future networks that meet the demands of urban life and urban creativity is one of providing control and agility at the same time. Networks need to maximize total value of ownership for the operator. Ericsson proposes three key principles to guide network design in striving for a network that is scalable, smart and delivers superior performance:

- Taking a holistic design perspective
- Providing sufficient underlying network enablers
- Ensuring that these enablers can be used and controlled.

Finally, network design is always about striking a balance between optimizing for today’s services and for the long term. Scalability, smartness and superior performance should always be prioritized according to each operator’s business plan.

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