Nokia All-IP radio access network backgrounder

The volume of IP-based traffic has already exceeded that of circuit-switched traffic in most fixed networks. The same change will take place in mobile networks as new mobile services become available and are used by more people in their daily communications. Current estimates show that in advanced mobile communications markets, packet-switched traffic will overtake circuit-switched traffic by 2005.

All-IP communications combines different media and services into a single session, generating additional traffic and revenue. The growth in data bits used in communications will exceed the growth in revenue, driving operators to optimize their networks to support the dominant type of traffic.

There will be a rapid increase in the number of IP-based services that need to be delivered by operators' mobile networks. The voice-dominated traffic mix carried by today's networks is rather predictable. By contrast, the wide variety of new IP-based services and end-users will have many different Quality of Service attributes that must be efficiently met by the network. In addition, the payload/signaling mix of these new services will vary between different services over time, placing new requirements on the scalability of the network. As future traffic is dominated by packet-switched traffic, the most profitable networks are clearly those optimized for this type of traffic.

The Nokia All-IP Radio Access Network (RAN) comprises a network architecture that is fully optimized for packet-switched traffic and which will bring the benefits of the Internet type of architecture to the RAN. By relocating key functions within the RAN and using a distributed architecture with no fixed connections between any elements, the RAN can be used much more efficiently. This will cut annual RAN capital expenditures by 30%, compared to conventional hierarchical RANs. Nokia's All-IP RAN combines GSM/EDGE, WCDMA and WLAN into a unified access network. This is achieved through use of multimode base stations, Common Radio Resource Management and radio-access control functions.

In addition, this distributed architecture enables efficient IP transport and improves the scalability of the RAN, making it easier for an operator to respond to increases in traffic and changes in the service mix. Nokia All-IP RAN will also enable the operator to build end-to-end Quality of Service support inside the RAN.

The Nokia All-IP RAN supports all legacy terminals and provides open interfaces to the 2G (the A interface) and the 3G (Iu interfaces) core networks, allowing the RAN to be used as part of a multivendor network. Operators can slowly implement the Nokia All-IP RAN in conjunction with an existing RAN in those areas with a high share of packet traffic, and hence will benefit the most from the new architecture.

The Nokia All-IP Strategic Architecture is Nokia's vision for the future of communications networks. This visionary architecture unites mobile access, fixed access and service integration into a single IP-based network architecture. Mobility and connection control is managed by common servers. This simplifies the role of the backbone network to that of

essentially a very high-capacity transmission network. The Nokia All-IP Mobility System, as the wireless component of this Strategic Architecture, provides the means to combine mobility with the Internet. The Nokia All-IP Mobility System comprises the Nokia All-IP Radio Access Network and the Nokia All-IP Core Network. It is designed to provide service flexibility, service deployment, evolution and backward compatibility with current networks.

The benefits of Nokia All-IP RAN

When adopting an Internet type of network, where user and control planes are separated and the controlling functionality is transferred to the base station (BTS), several advantages are achieved. Mainly these are:

- Scalability to handle any future service mix by separating control and user planes, allowing capacity to be added where needed.
- Dynamic resource sharing between different network elements is performed by many-to-many connections, enabling full utilization of all existing element capacity.
- A single multi-radio network that is easier to operate and uses resources better. Also, investments can be focused on one set of network elements.
- Optimized Quality of Service, ensuring the required user service performance with the lowest costs to the operator.
- Improved efficiency of the transport network, combining GSM/EDGE and WCDMA transports together with other IP services.
- Smooth evolution to All-IP, protecting existing and future investments.
- Lowest cost per bit, with 30% annual CAPEX savings compared to the conventional RAN/BSS

See also the All-IP backgrounder and the All-IP Core backgrounder.