Before 3G Wireless Networks

What is 3G?

3G is the third (next) generation of wireless network technology that provides high speed bandwidth (high data transfer rates) to handheld devices. Specifically, 3G wireless networks support the following maximum data transfer rates:

- 2.05 Mbits/second to stationary devices.
- 384 Kbits/second for slowly moving devices, such as a handset carried by a walking user.
- 128 Kbits/second for fast moving devices, such as handsets in moving vehicles.

With such high bandwidth rates, 3G networks will be able to offer a variety of new services that combine high voice quality telephony, high-speed mobile IP services, information technology, rich media, and offer diverse content.

What Came Before 3G?

3G wireless networks represent an evolution of wireless network technology, and were preceded by 1G, 2G, and 2.5G wireless networks.

1G

The first wireless cellular systems (1G) started appearing in the 1980s. 1G networks are based on the AMPS (Advanced Mobile Phone Service) standard. Unlike their predecessor wireless networks, 1G networks are based on the idea of cells. 1G networks provide analog voice service but no data service. 1G was analog, not digital. The spectral efficiency[1] of 1G networks was very low and the effective "energy/bit" was high. Handsets had short talk/standby times.

2G

2G wireless networks are digital networks (for spectral efficiency and not for digital services). There are several 2G standards in use:

[1] Spectral efficiency is a rating indicating how efficiently available bandwidth is used to transmit data.

- TDMA (Time Division Multiple Access). Used primarily in the USA.
- GSM (Global System for Mobile Communications). Widely used in Europe and countries other than USA, now appearing in the USA.
- CDMA (Code Division Multiple Access). Used in USA and its use is spreading in the rest of the world.
- PDC (Personal Digital Cellular). Used only in Japan where iMode uses packet switched PDC.

Some characteristics of 2G networks are:

- Maximum data rates of 9.6 Kbits/second to 14.4 Kbits/second if you are in just the right place.
- Digital voice (results in a lower quality voice but uses less precious spectrum).
- Enhanced telephony features such as caller-id.
- Services such as text based messaging (big winner), downloads of still images and audio clips, etc.

2.5G (Between 2G and 3G)

2.5G networks, which are still not available everywhere, are essentially General Packet Radio Service (GPRS) packet overlays on 2G networks. Besides enhancing GSM and TDMA networks by making them packet-based networks, GPRS also increases their data rates. GPRS is primarily a software upgrade of GSM.

Some characteristics of 2.5G networks are:

- Data rates of 64 – 144kb/second.
- Packet based.
- Always-on connectivity.
- Instant messaging with small attachments.

A new wireless standard, Enhanced Data GSM Environment (EDGE), has been developed to increase the bandwidth of GPRS. EDGE triples the bandwidth capacity of GPRS to 384 Kbits/second thus allowing GSM and TDMA operators to offer high-speed services. EDGE based networks fall in between 2.5G and 3G networks.

New Killer Applications

Two 2G wireless data applications have turned out to be big winners:

- iMode (Japan): Downloading of images to mobile phones and forwarding them to other mobile phones.
- GSM (Europe and countries other than USA): Sending short text messages from one mobile phone to another using the Short Message Service (SMS).

Where Can I Find More Information?

- CDMA (http://www.cdma.com/).
- GSM (http://www.gsmworld.com).

Information about wireless networks and products can also be found at the websites of the telecommunications equipment manufacturers:

- Erricsson (http://www.ericsson.com/).
- Lucent (http://www.lucent.com/).
- Nokia (http://www.nokia.com/).
- Nortel (http:// www.nortelnetworks.com /).
- Siemens (http://www.siemens.com).

SILICON PRESS www.silicon-press.com
Email: info@silicon-press.com
Tel: 908-273-8919 Fax: 908-273-6149