

Converging Broadband and Mobile

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Nokia

Rich mobile services drive demand for bandwidth

Messaging

Basic text messaging

Multimedia messaging with pictures and audio

Multimedia messaging with video

Corporate access

Dial-up connections

Always-on, performance and security enhancements

Accelerated connections, voice and data multitasking

Browsing

Black and white screens, simple graphics

Instant connectivity, colour screen, WAP Push

xHTML for WAP and web integration, animated content

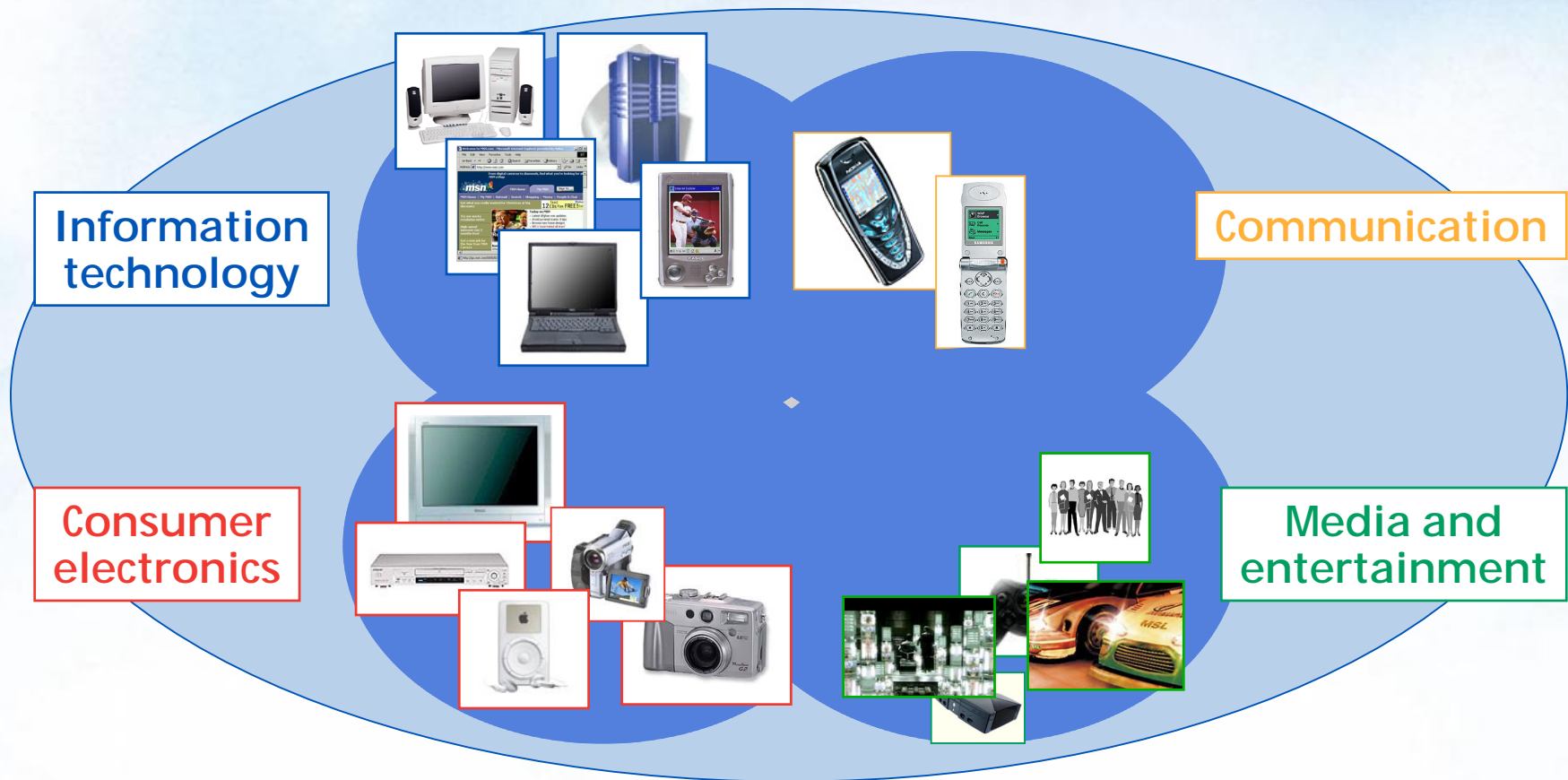
Downloading

Ringing tones, icons, screensavers, business cards

Downloadable applications, MIDI sounds

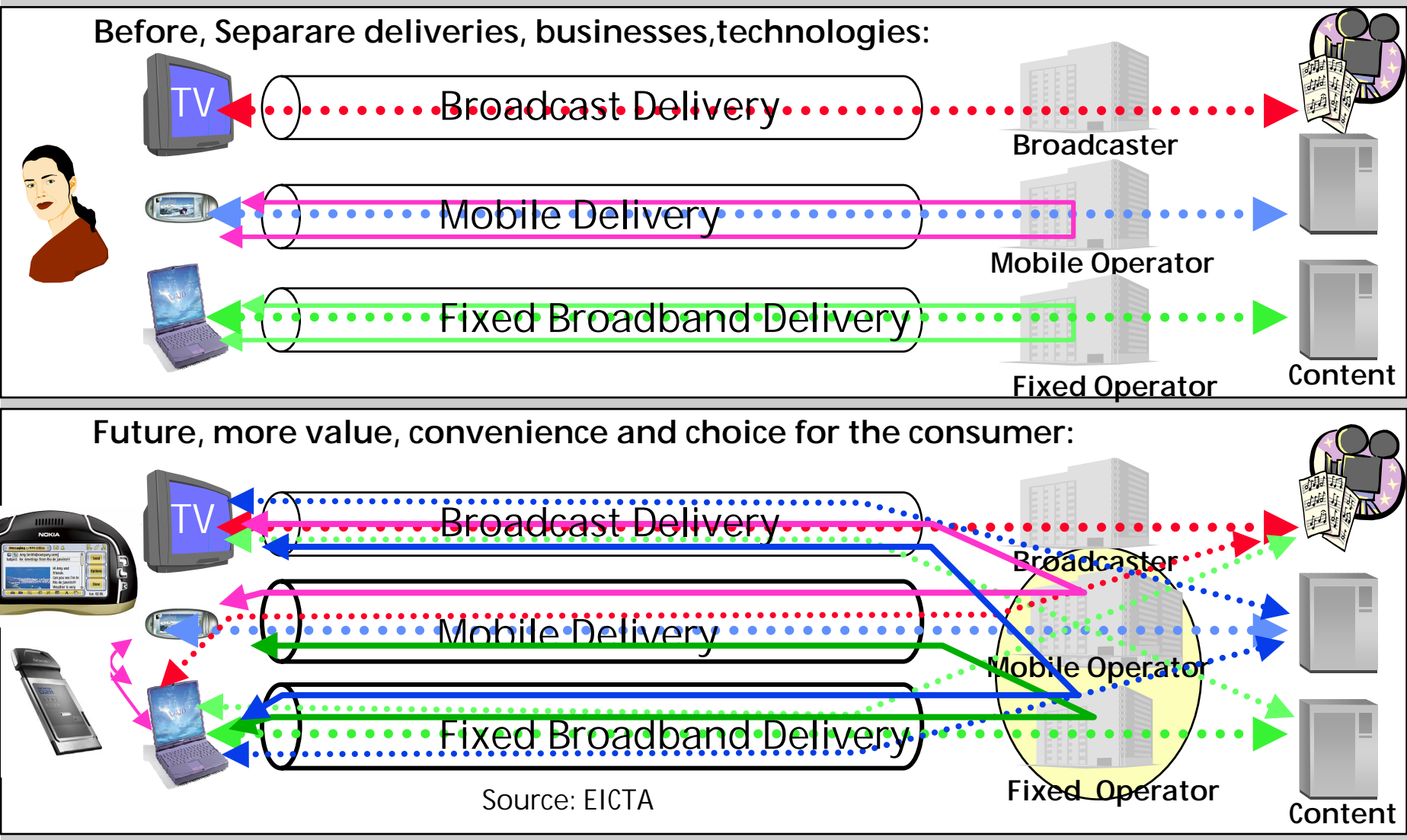
Video content (MMS, streaming)

We are seeing the converging digital industry taking shape



The converging digital industry brings together parts of consumer electronics, communication, information technology, media and entertainment industries

Vision of convergence: EICTA view



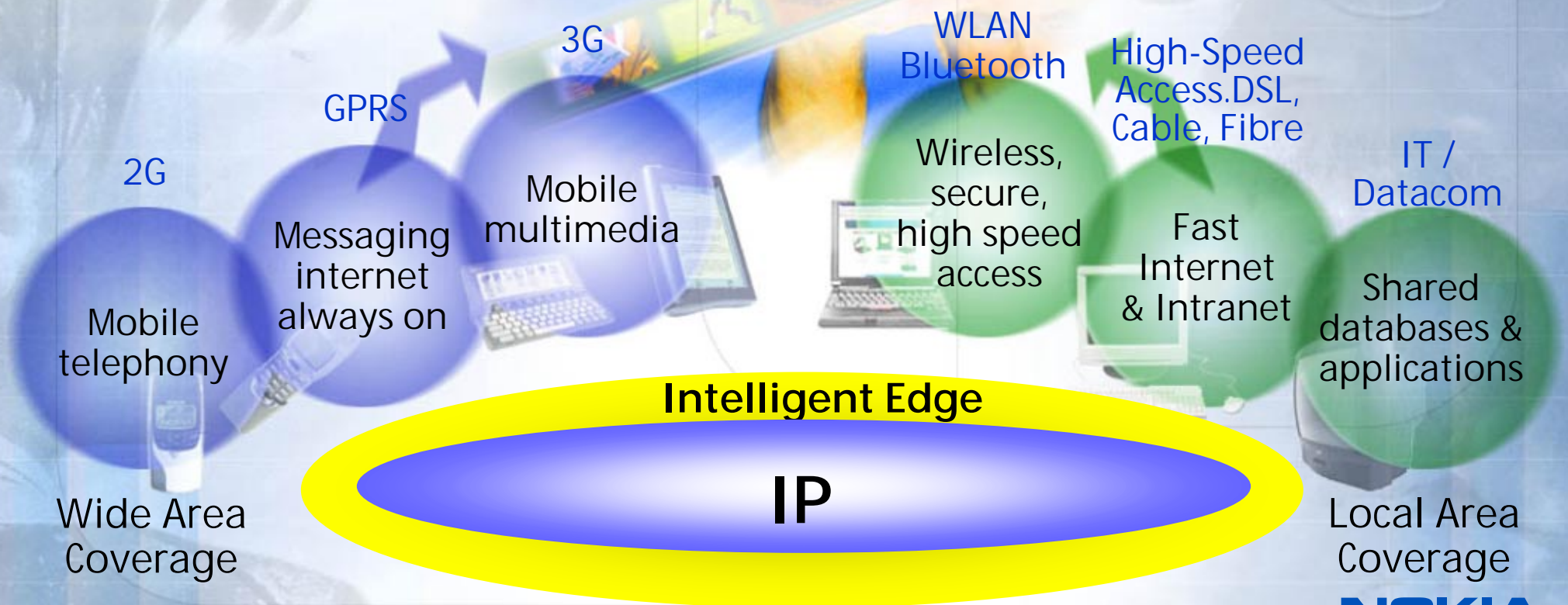
New convergence services emerging

- Rich Media Delivery
 - Order content through mobile
 - Delivery alternatives through GPRS or DSL
- Multimedia messaging between Mobile and PC
 - Real time delivery of messages
- Push to Talk (PoC)
 - Push to talk service for Family and business group
- See What I See from mobile phone to PC
 - IMS controlled sessions with real time video delivery
- Interactive on line gaming with PC and mobile

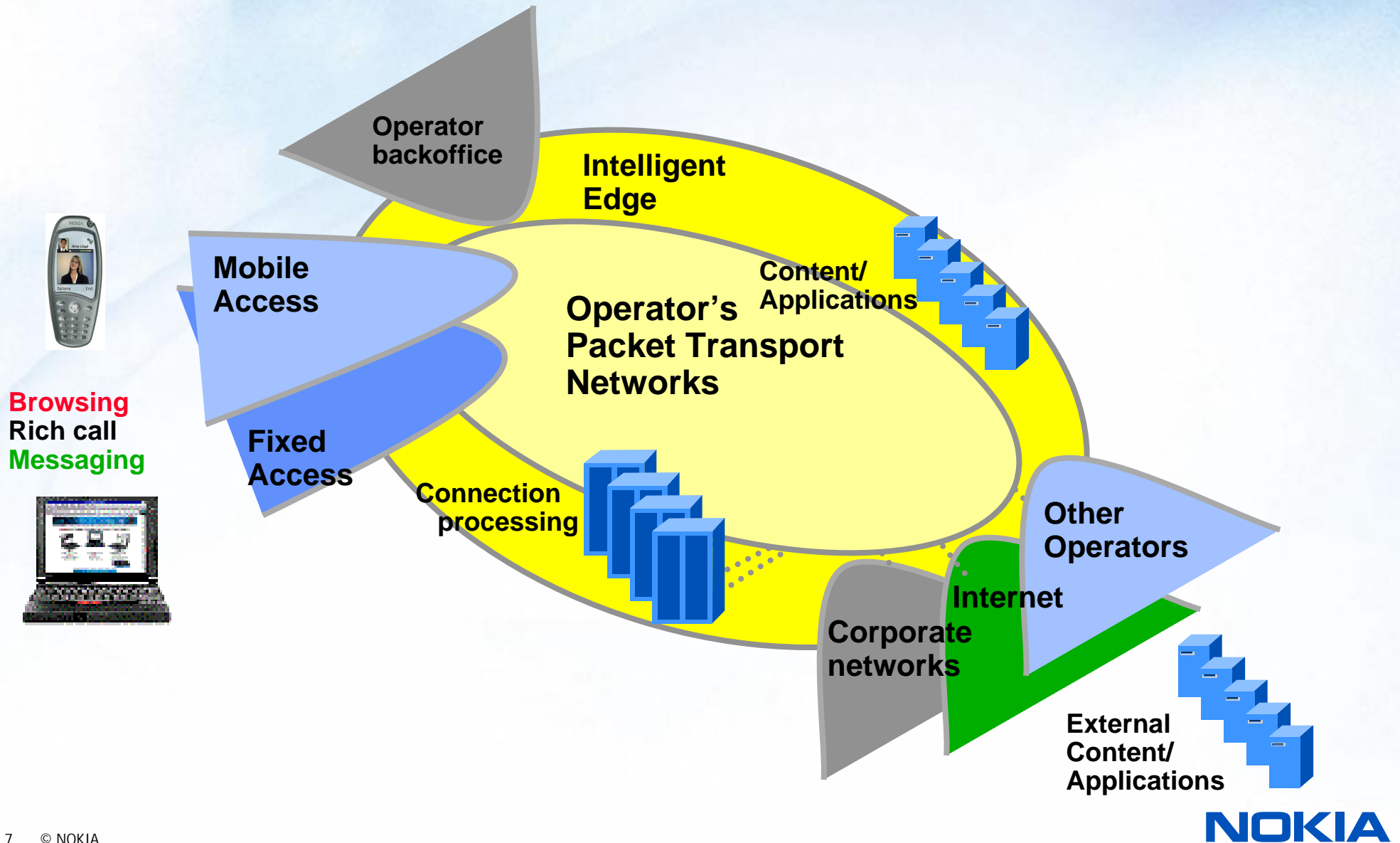


Nokia's vision of NGN & convergence

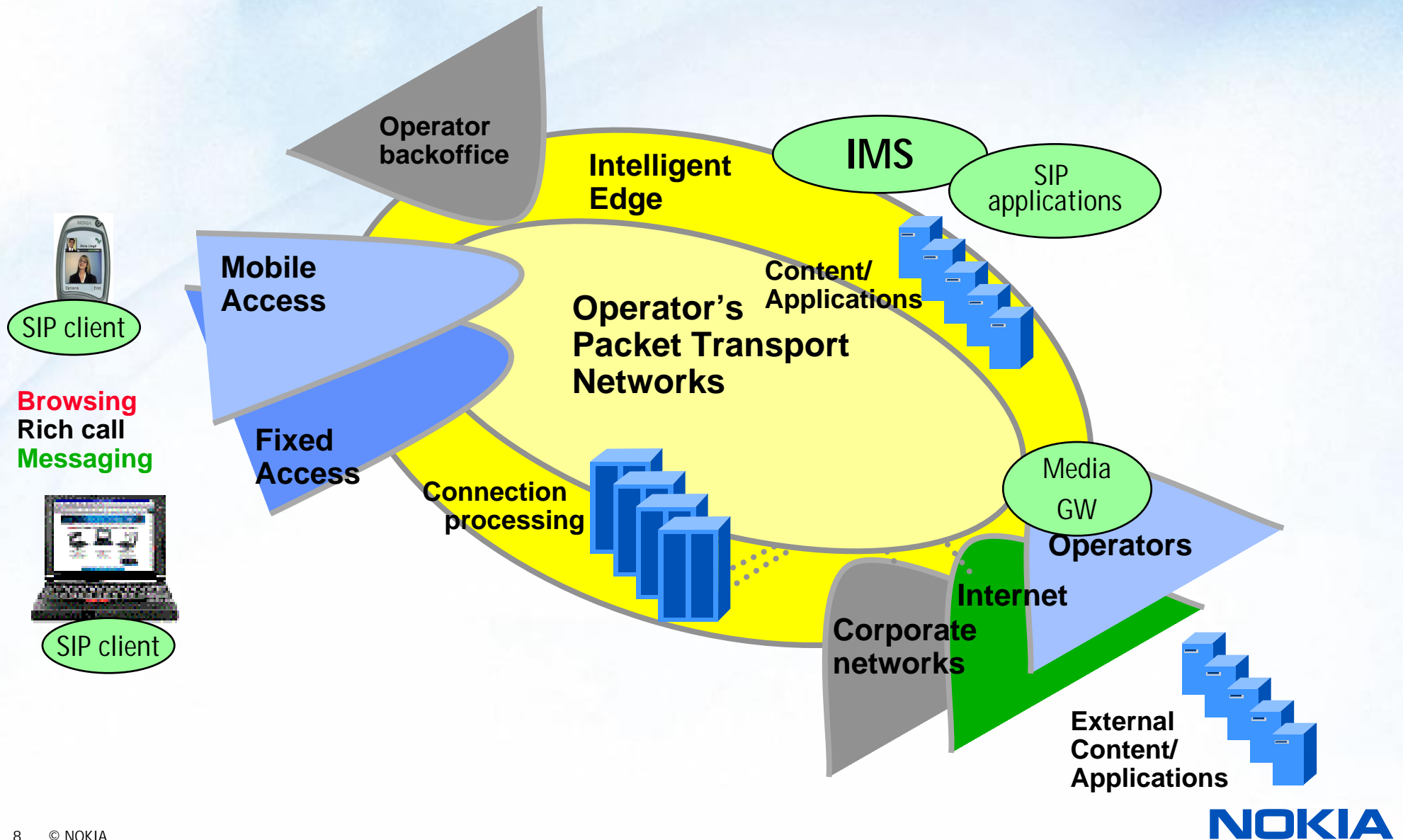
Unified Applications and Seamless services



Converging network architecture



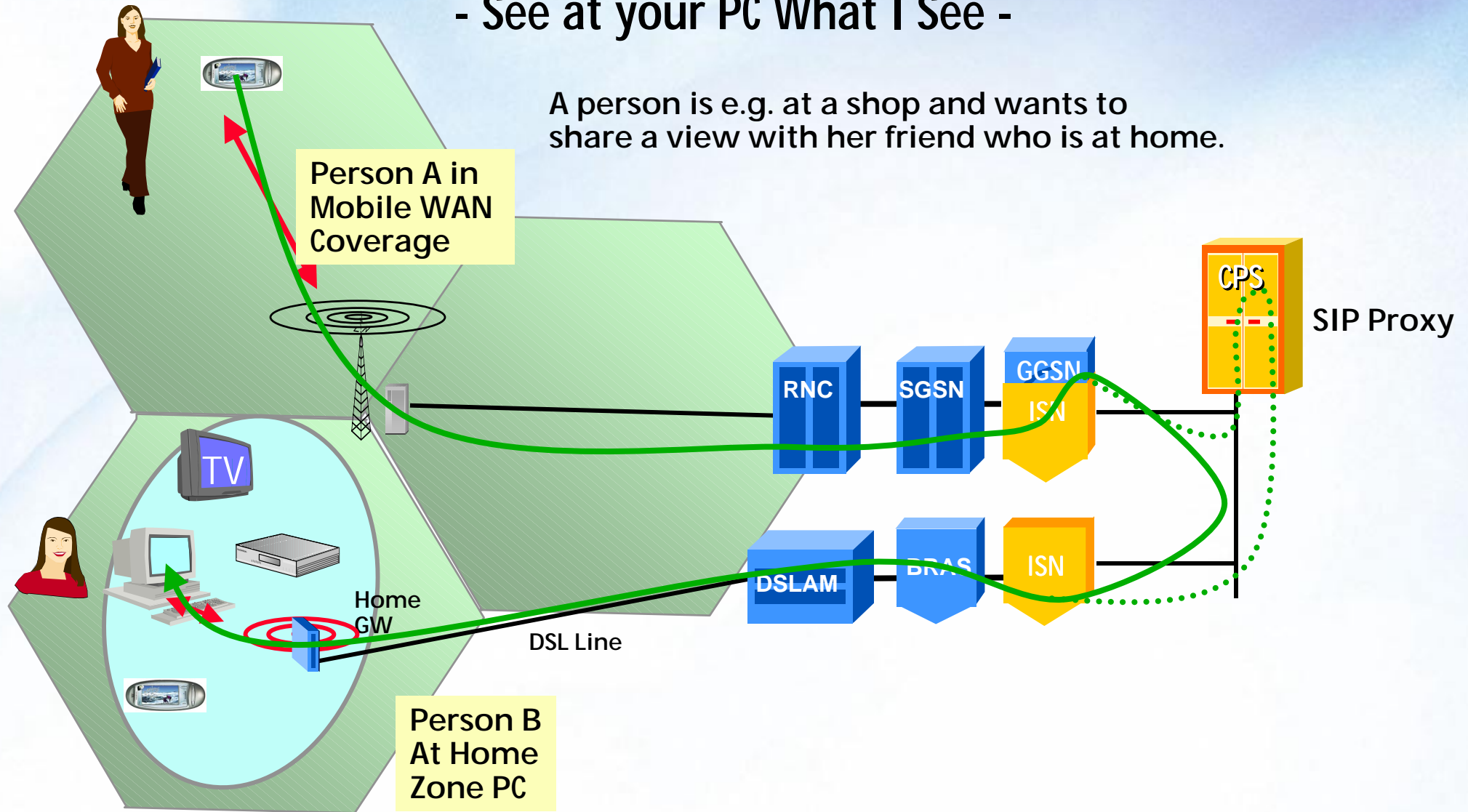
Future packet voice and rich call solution based on 3GPP architecture



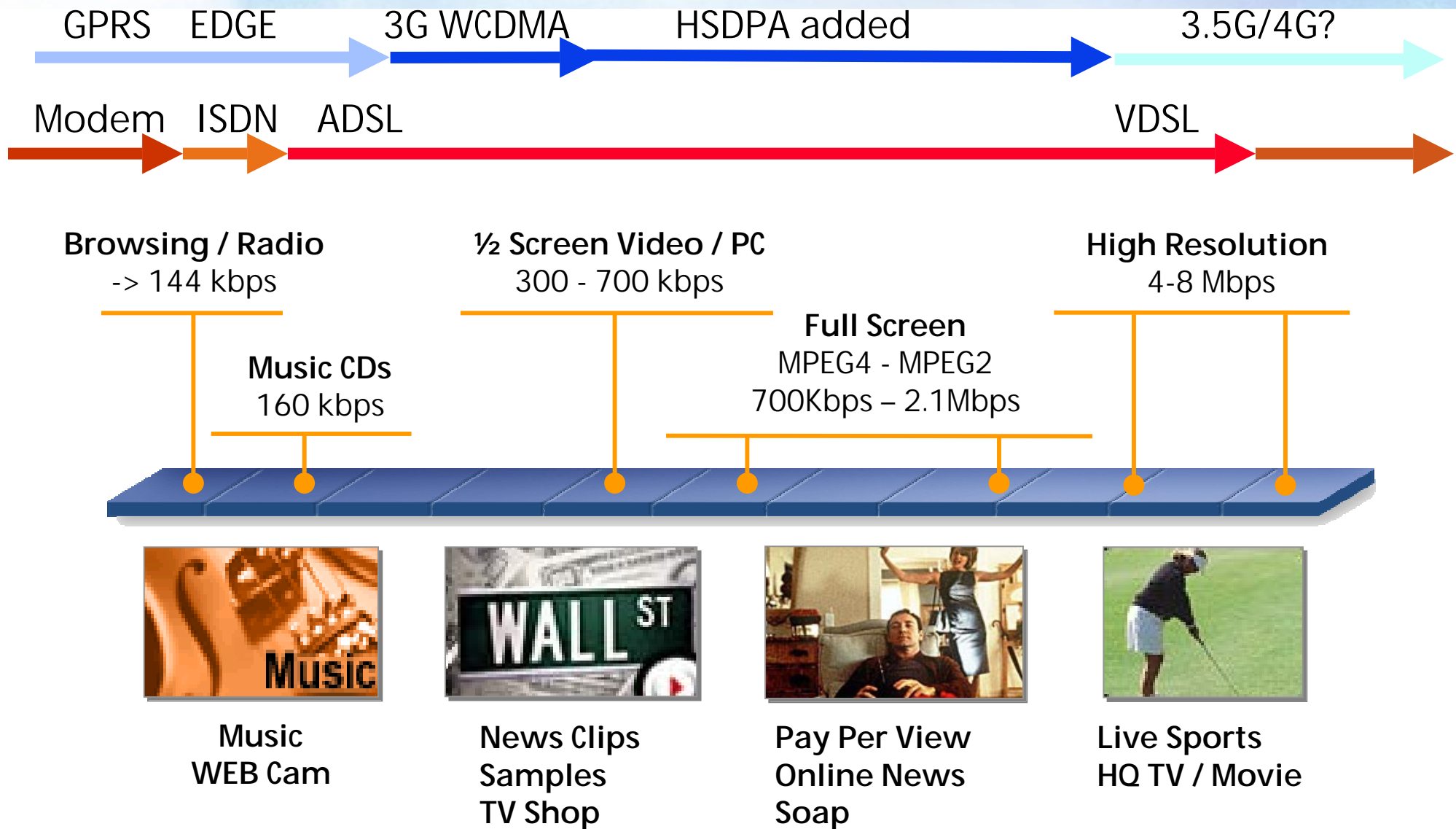
Example of a convergence service:

- See at your PC What I See -

A person is e.g. at a shop and wants to share a view with her friend who is at home.



Typical application bit rates



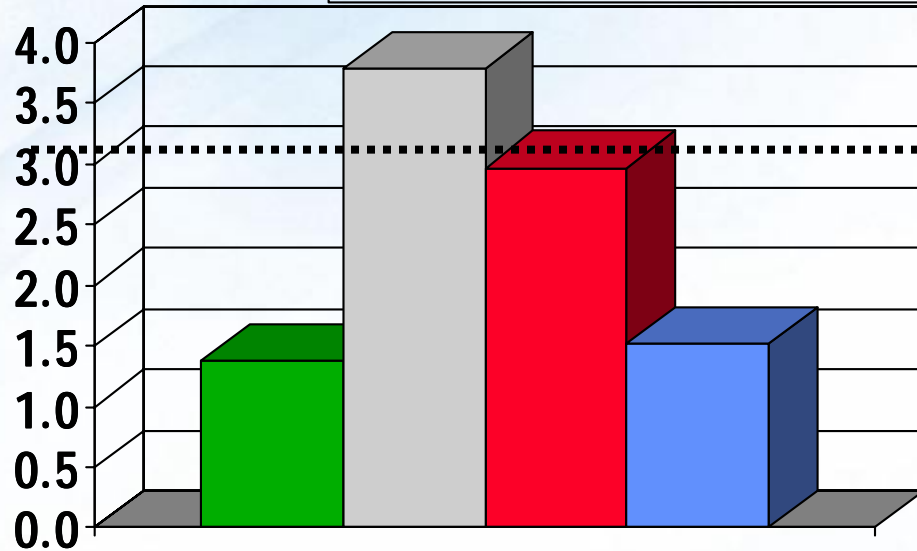
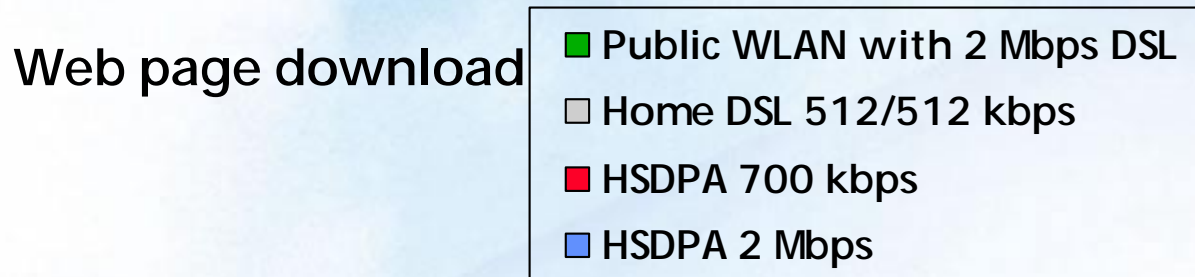
Performance - what matters

- In some countries DSL service available up to 12 Mbps or even above
 - In many countries mass market 256 - 512 kbps, up to 2 Mbps
 - Current 3G WCDMA systems offer up to 384 kbps
 - HSDPA brings usable bit rates in excess of 2 Mbps
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- Important issue is user experience of major services
- For typical web applications like browsing, instant messaging and email the difference is not big
- For communications oriented services like PoC, VoIP, and SWIS difference is minor
- For mobile devices lower bit rate video is often quite adequate due to smaller screen size

End user performance – Web browsing

Web page download



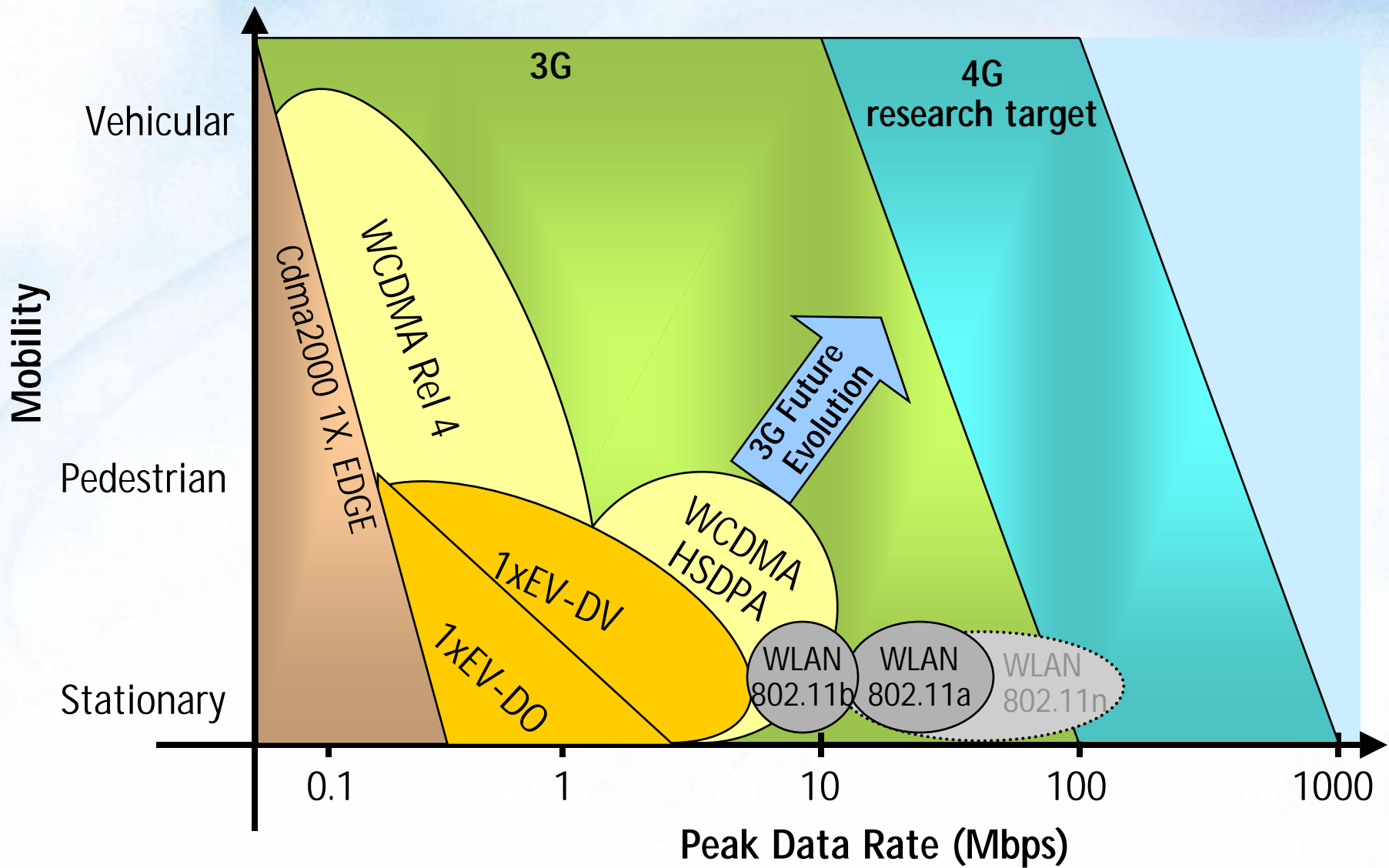
100 kB

3 second max from click-to-consume

- Server and client delays may become limiting factors for fast access

- HSDPA is fast enough for web browsing – below 3 second click-to-consume
- Macro cell HSDPA (700 kbps) faster than 512-kbps home DSL today
- High end small cell HSDPA (2 Mbps) similar to public WLAN

Mobile bit rates can be enhanced beyond HSDPA



Summary

- Always on data connections over IP and digitalization of content are driving convergence
- Broadband connections and 3G mobile are enabling technologies
- For most convergence services user experience over 3G mobile is close to fixed broadband
- Performance of both mobile and fixed broadband will be further improved in the future

Fixed and mobile broadband work well together to enable anywhere, anytime access to rich services



The image features the Nokia logo and tagline centered on a light blue background with a subtle, abstract pattern of overlapping curved lines. The logo 'NOKIA' is rendered in a bold, blue, sans-serif font, while the tagline 'CONNECTING PEOPLE' is in a blue, serif font.

NOKIA

CONNECTING PEOPLE