Mobile Internet in Japan

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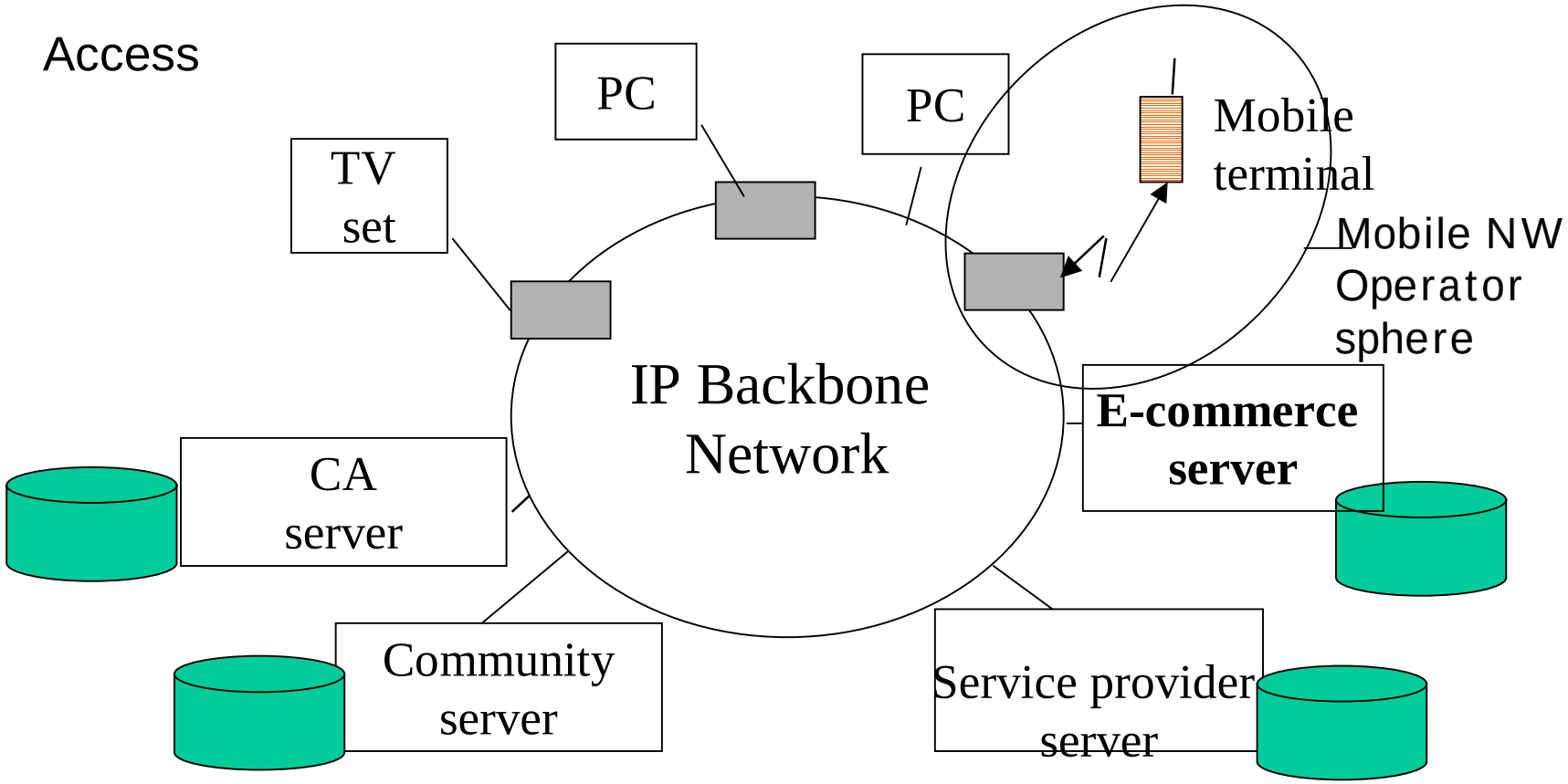
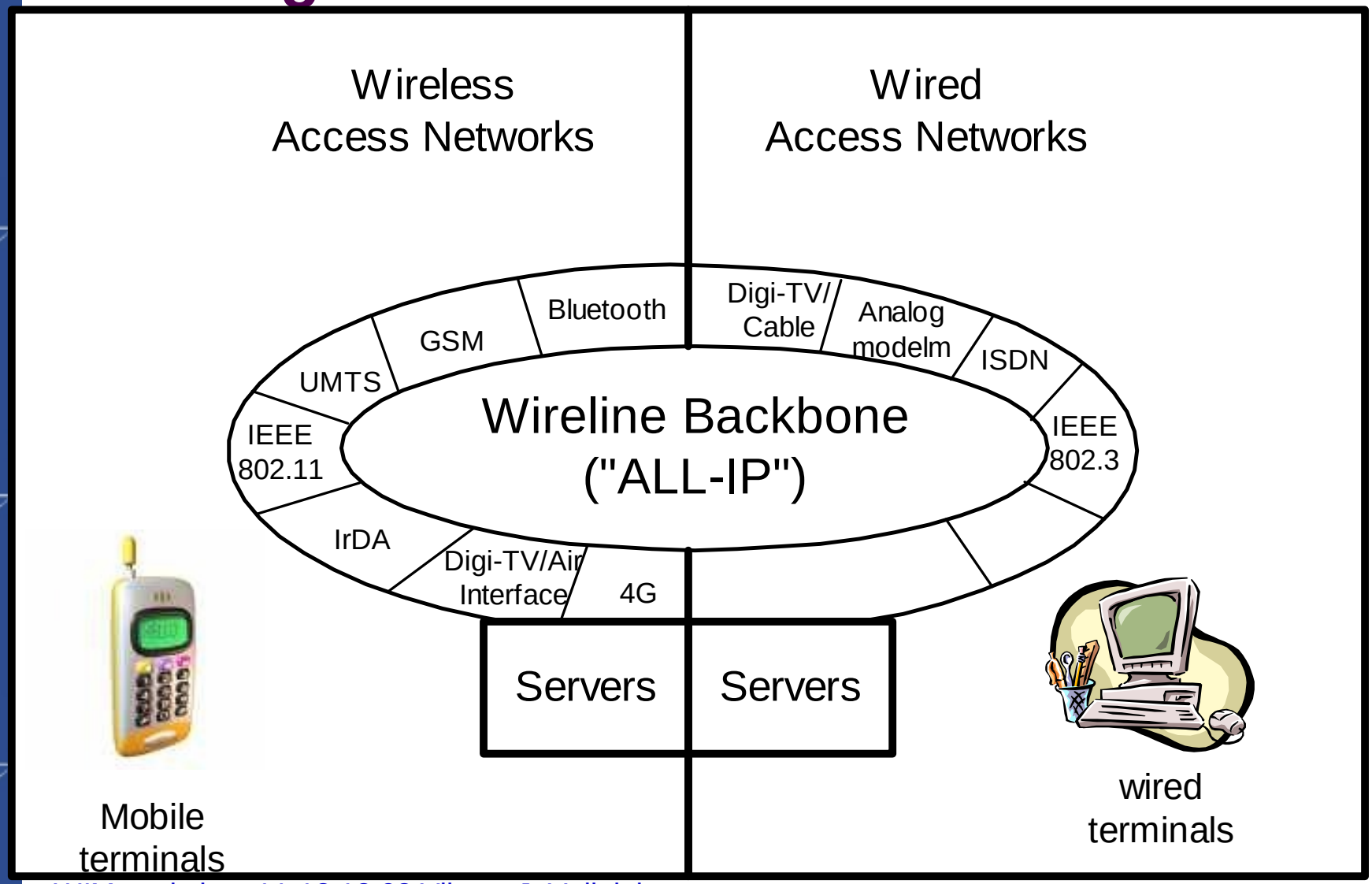
1. The big picture: „All-IP“ vision

- Access



1 Introduction: Access Network technologies



1 Introduction: Some measures for the big picture

- Global wireless infrastructure based on GSM technology is truly global with its roaming capability and coverage.
- At the end of 2002, there were 454 GSM operators worldwide in 182 countries, and they served over 730 million users.
- In 2002, 75 percent of the new mobile customers started to use GSM terminals and services offered by the GSM networks [www.nokia.com].
- The number of digital telecom handsets has exceeded 1.2 billion (in 2002, ca. 400 million handsets were sold) and by 2008 perhaps 2 billions.

1 Introduction: Some measures for the big picture

- Of these handsets hundreds of millions are Internet-enabled (WWW, WAP- or I-mode -enabled).
- There are over a hundred million of servers at the server side (in Internet 1)

2. Perceptions on Mobile Internet (MI): mobility

- Tentative def: Mobile Internet = user mobility + services and content accessed over the Internet
- M1) **Mobility** could be realized without a wireless network:
  - While moving, the user accesses Internet, where there are terminals/access points available
  - The drawback of this concept is that the access is somewhere and sometimes, **not anywhere&anytime**, because access can only happen through terminals residing at some location that the user must visit
  - The Internet terminals at airports support this kind of MI concept; no service provisioning if the user moves
  - Roaming support? Security and privacy?

2. Perceptions on Mobile Internet:mobility

- 2) Another view on mobility in MI is one where there is a wireless access to Internet through **portable terminals** that are personal and carried by the users
  - M2a) WLAN wireless access network (WI-FI)
    - short range wireless access, coverage only provided in limited areas => not really anywhere&anytime
    - Internet-enabled terminals (run directly IP and the protocols above it), currently *laptop class*
    - the wireless capacity is usually free, but can be charged at hot spots (e.g. airports)
    - roaming support? hand-over support? IPv6 suggests solution to these

2. Perceptions on Mobile Internet: mobility

- M2b) wireless telecom network as access network
  - Either portable telecom terminals or laptops with a suitable (PCMCIA)-card as terminals
  - Network coverage is 100 % in densily-populated areas
  - Roaming support is provided for GSM and UMTS networks
  - Hand-over support in all 2G/3G networks
  - Wireless capacity costs
  - Thus: approximates 100 % anywhere&anytime access requirement and supports user mobility during service provisioning

2. Perceptions on Mobile Internet: mobility

- M2c) short range wireless access (Infrared, Bluetooth), portable terminals
  - This alternative has the same time and place limitations as 1), but the case differs from it in the sense that the user has a portable, private terminal
  - This option is used in Mobile commerce facilitating payments and also in authorisation for alternative M1) and M2b) (PTP protocol)
  - Terminals supporting this are mostly wireless telecom terminals

2. Perceptions on Mobile Internet: services and contents

- Services and contents can be common to stationary terminals and mobile terminals, but there are differences between mobile and stationary terminals and network capacities that require changes to contents, Thus:
  - SC1) at high-end portable terminals (laptops) the ”normal” (PC-based) Internet contents and services can be used
  - SC2) internet-enabled small terminals require specialized contents and services (cHTML, XHTML, WML, Location-based services), different from ”normal” contents and services

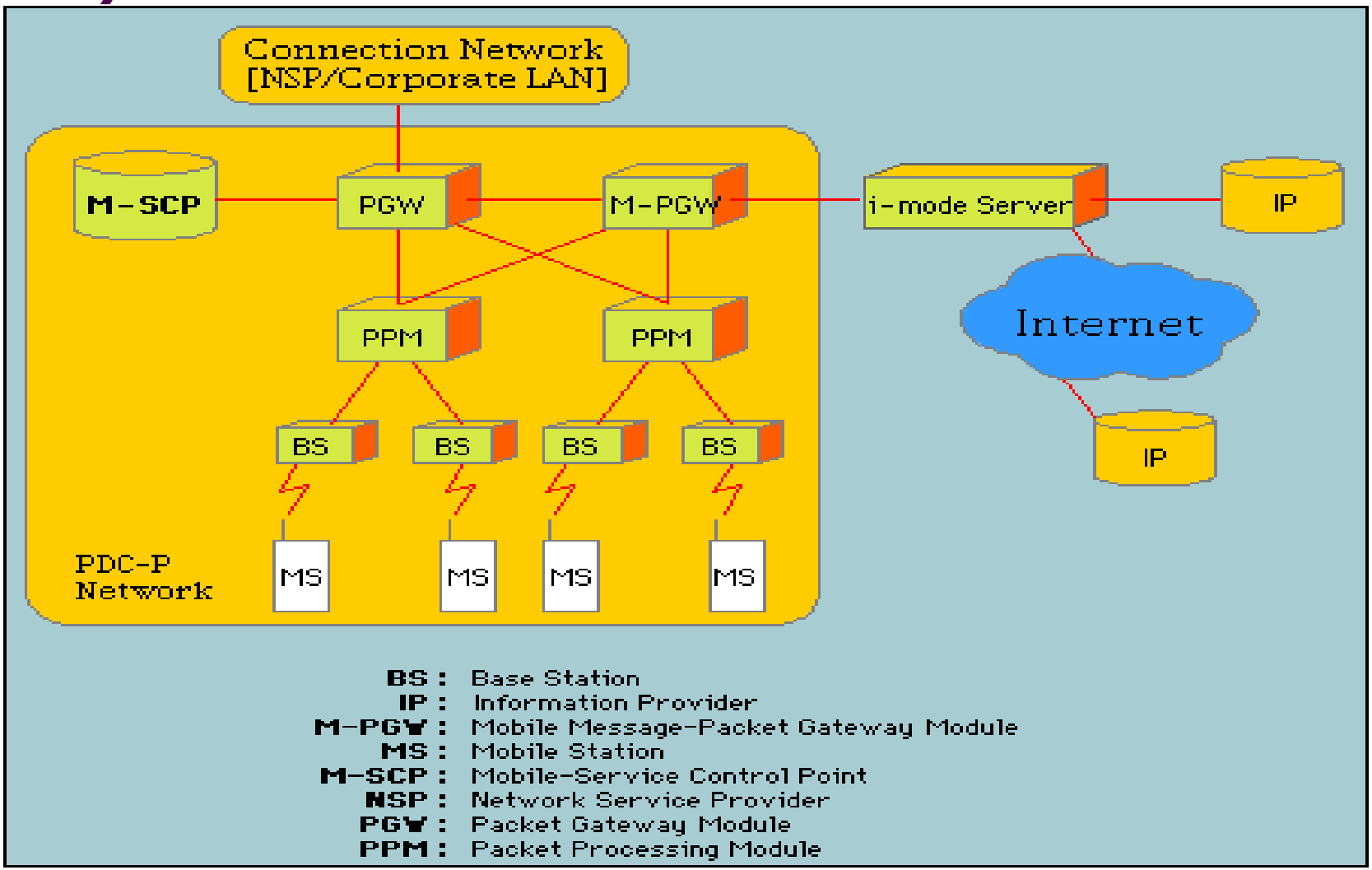
2. Perceptions on mobile internet

	M1)	M2a)	M2b)	M2c)
Internet-enabled laptop	N/A	-roaming support? WI-FI (IPv6 improves it) -no hand-over support (?IPv6) -SC1) +LBS possible -capacity 11 Mbps, free/cheap	-special card needed -roaming and hand-over support provided -SC1&SC2 possible -capacity costs, 9.6-384 kbps (2 Mbps)	-IR or BT support needed -no hand-over support -roaming? -SC1) and SC2 possible -capacity 1 (16) Mbps
Internet-enabled wireless telecom terminal	N/A	currently possible for PDA:s, in the future also for PTDs -SC1); SC2) possible, if the network offers them -capacity 11 Mbps, free/cheap	-hand-over support provided in 2G and 3G NW -roaming support in GSM and 3G -SC1?&SC2 poss. -capacity costs, 9.6-384 kbps (2 Mpbs)	-IR or BT support needed -no hand-over support -roaming? SC1?&SC2 possible

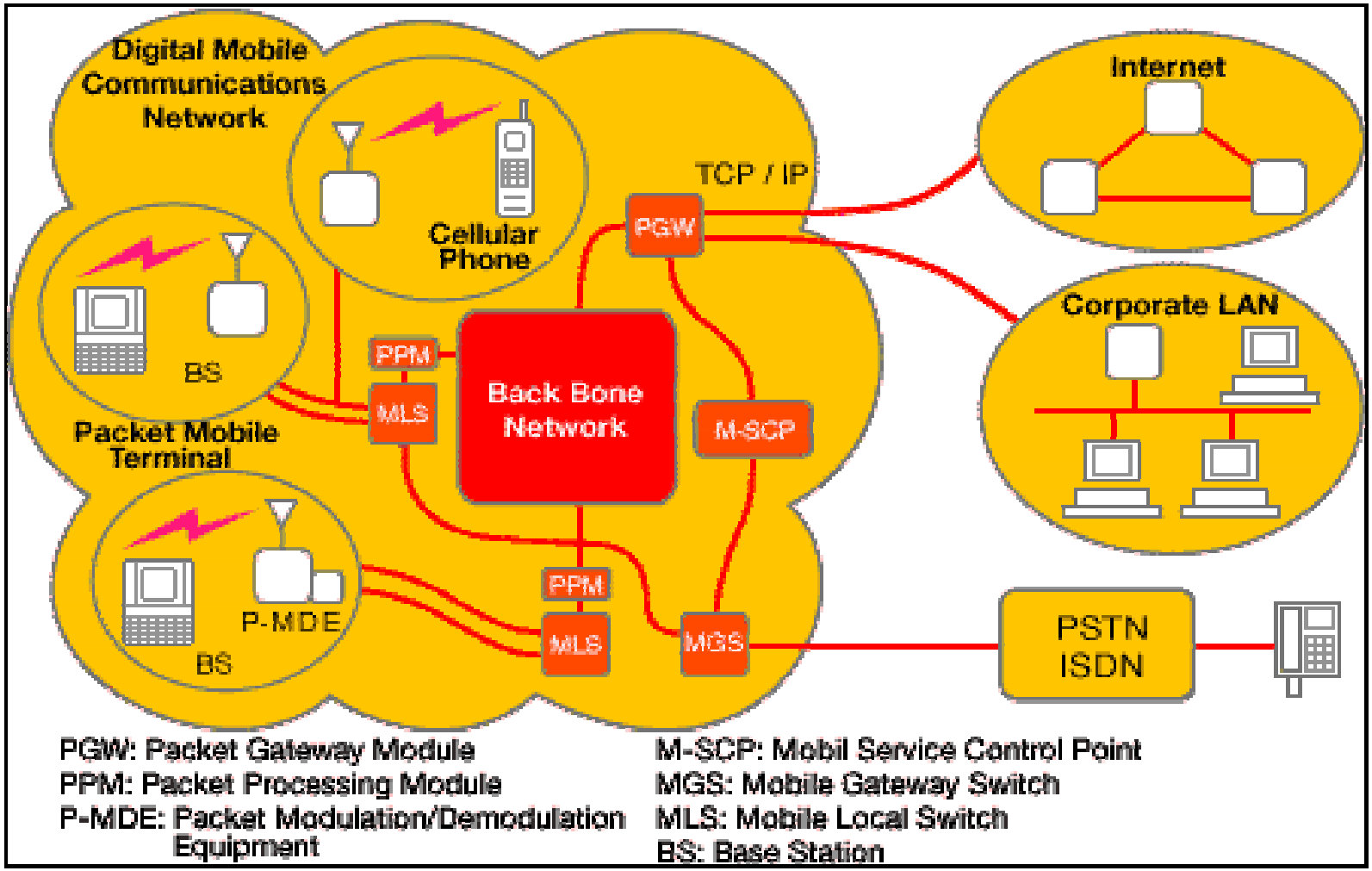
2. Perceptions on mobile internet

- in USA Mobile Internet has been perceived as laptop+M2a) ; maybe shifting to the right in the table
- in Japan MI is perceived as mobile telecom t.+ M2b); cHTML is the leading contents format
- in Europe MI is perceived mostly as in Japan, but the content formats in SC2) and services have been different (WAP+WML)
- the terminals will support M2a-M2c) and *always best connected* mode of operation (satellite networks can also be included)

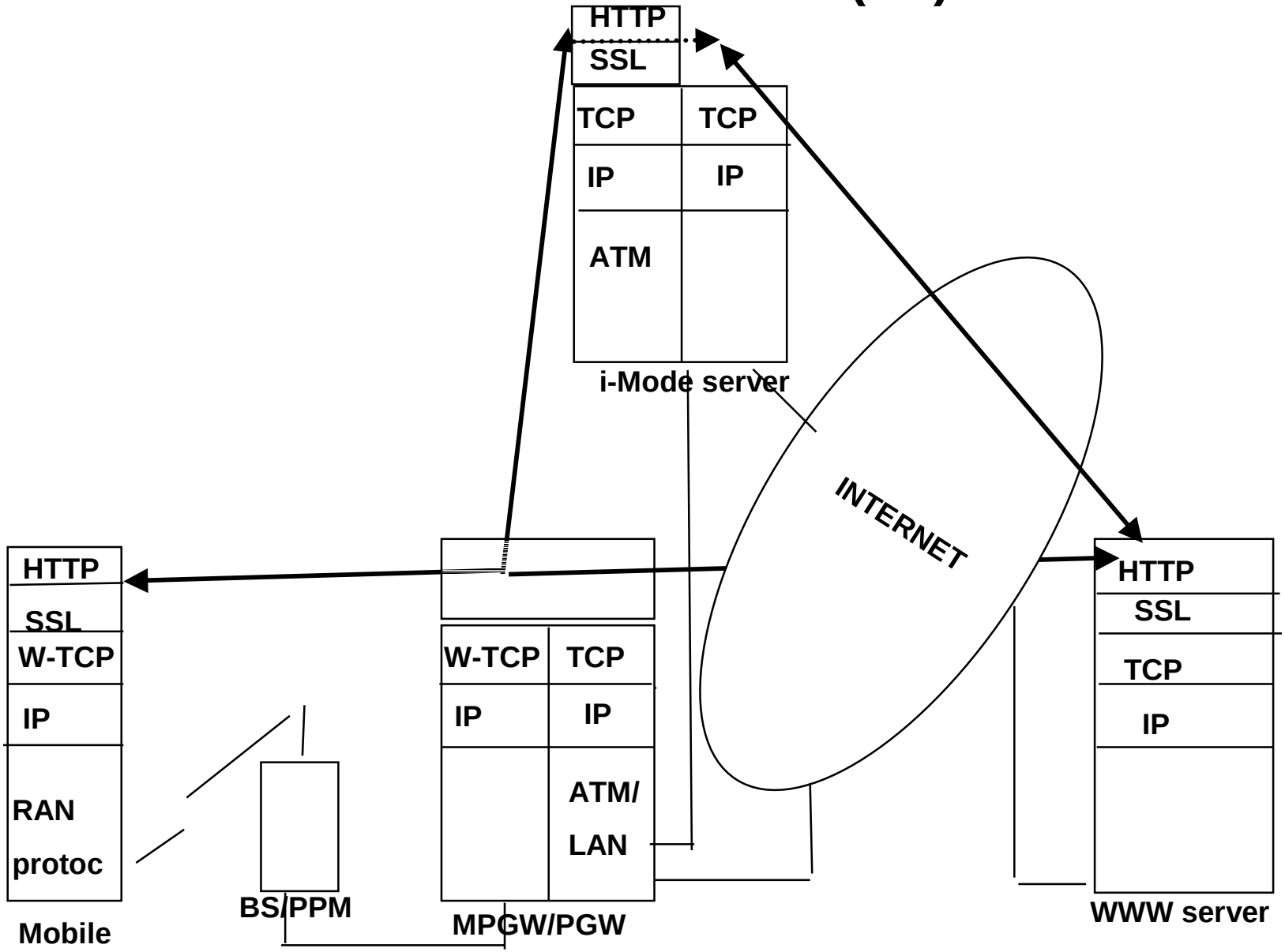
2. i-Mode horizontal architecture: M2b)&SC2



2. i-Mode packet network DOPA



2 i-Mode: Protocol stacks in FOMA (3G) case



3. What is M-commerce? In nutshell:

- M-commerce is Internet-based e-commerce performed using mobile portable (telecom) terminals + *all location-related transactions, i.e. Location Based Services (LBS)*
- LBS are a special feature of M-commerce making possible new kind of services based on the (actual) location of the terminal (Personal Trusted Device, PTD)

3 What is M-commerce; special kind of E-commerce (a BROAD definition of E-commerce by OECD)

- An **electronic transaction** is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over **computer-mediated network**s. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off -line.
- **Includ**e: orders received or placed on any online application used in automated transactions such as Internet applications, EDI, Minitel or interactive telephone systems.

3. A definition for M-Commerce

- An M-commerce transaction is an E-commerce electronic transaction that is conducted using a *mobile terminal* and a *wireless access network,* such as Wireless LAN, 2G or 3G telecom network, Bluetooth connection, or an Infrared connection.
- **M-commerce is an activity that consists of performing M-commerce transactions and related actions, such as payments**.
- Note1: actors launching M-commerce transactions can be humans or machines
- Note2: the definition must be adapted to new technologies

3 Differences between M- and E-commerce

- M-commerce transactions: anywhere and anytime
- *LBS* that use the actual location of the terminal on earth in one way or the other to
- Smaller resources of the mobile terminals than fixed terminals (UI, memory, speed, battery)
- Smaller transfer capacity of the wireless access networks and more error prone communications

3. Commonalities between M-Commerce and E-commerce

- There is the a common e-commerce infrastructure on Internet (and/or on telecom network) and that it can be accessed through mobile portable terminals (using WAP or i-mode)
- Also in this respect M-commerce is a subset of E-commerce

3. M-business prospectives

- Due to the huge number of terminals and emerging Location-Based Services and other Mobile Internet services that are the most natural M-commerce applications, there is a rather considerable potential for M-commerce and M-busines
- There are still obstacles currently: the technology is not mature and it raises fears of security and privacy.
- The terminals are not as convenient as PC:s for conducting E-commerce transactions designed for PC:s and wired Internet => they need special contents and services

3 M-business prospectives

Mobile electronic Transactions Forum

framework for secure mobile transactions

http://www.openmobilealliance.org/

3 Predicted M-commerce Revenues, 2001 – 2005 (www.transactionmagazine.com/)

Research Entity (USD billion)	2001	2002	2003	2004	2005
Datamonitor (2000)	1.5	3.5	5.0	7.5	8.5
Forrester Research (2000)	1.0	2.5	7.5	14.0	22.0
Durlacher (realistic/interpreted)	3.0	3.5	5.1	10.0	19.0
Frost & Sullivan (1999)	8.0	10.0	15.0	19.0	24.0
Consult Hyperion (7 countries, 2001)	2.5	3.5	4.5	5.5	7.5
Jupiter Research (2000)	1.0	2.0	3.0	5.0	8.0

http://www.epaynews.com/statistics/mcommstats.html#9

4. Mobile Internet in Japan

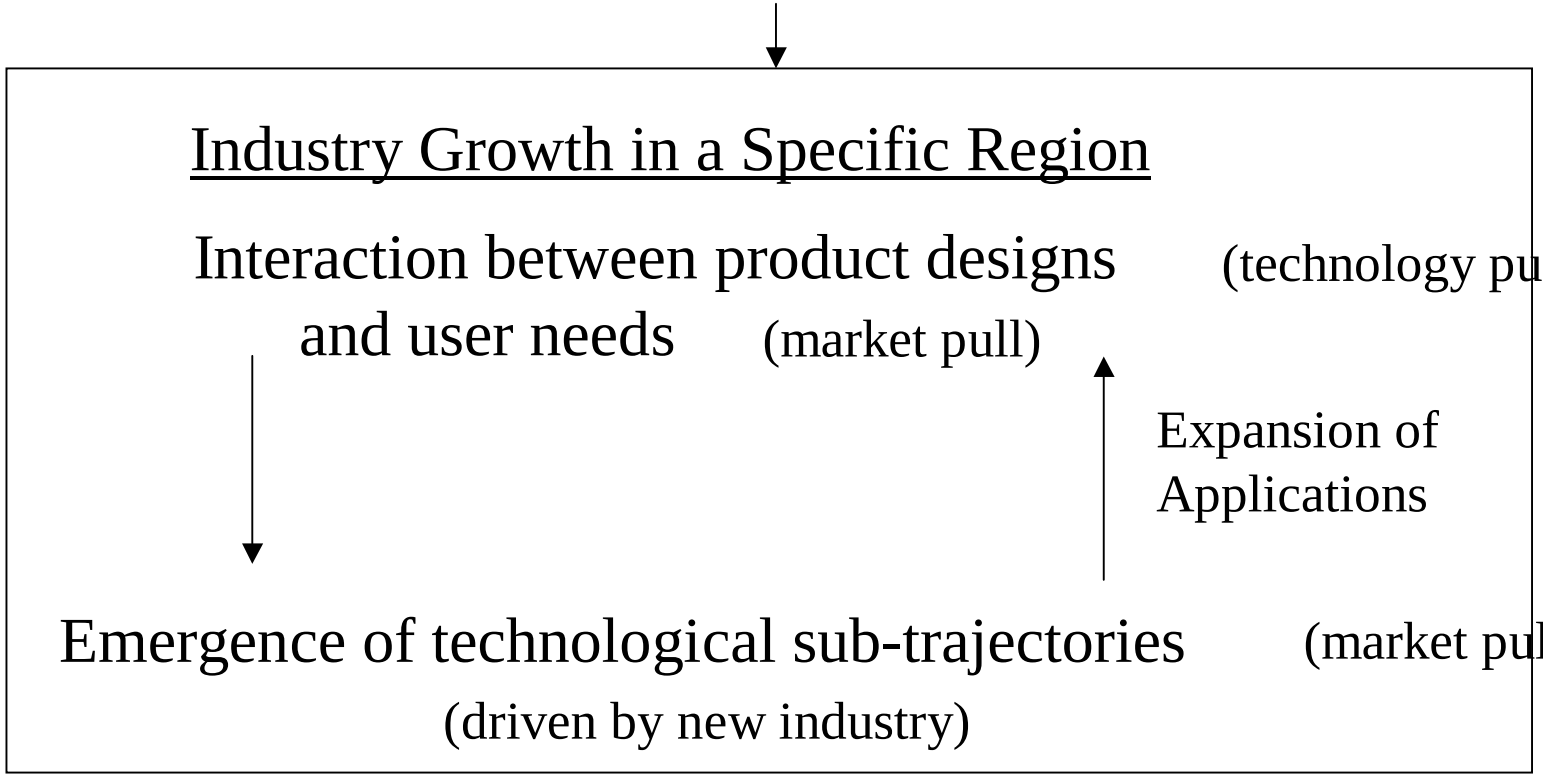
- The following material comes from Prof. Jeffrey Funk, Hitotsubashi University, Tokyo, Japan
- Each foil borrowed from his lecutres has his name or initials (J.F.) in the title field of the transparency
- For a more detailed information the reader of this material is urged to consult his newly puhlished book Jeffrey Funk: *"Mobile Disruptions: The technologies and Applications Driving the Mobile Internet"*, John Wiley & Sons Inc; ISBN: 0471511226

4. Model of New Industry Formation (J.Funk)

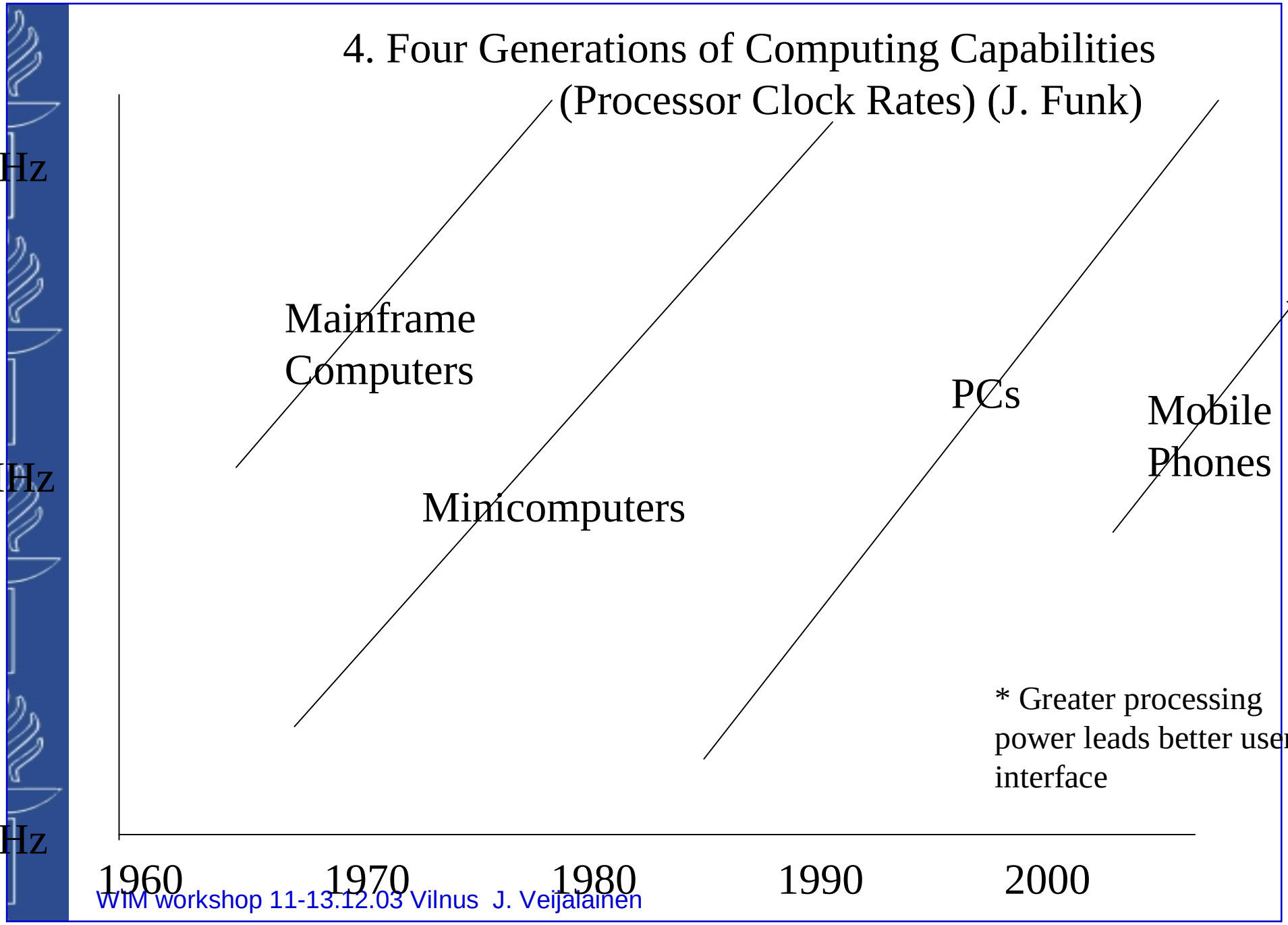
Technological Trajectories

(from outside the industry)

(technology push)



Effect of sub-trajectories on other industries


4. Four Generations of Computing Capabilities
(Processor Clock Rates) (J. Funk)
1GHz
1MHz
1KHz
Mainframe
Computers
Minicomputers
PCs
Mobile
Phones
*
* Greater processing power leads better user interface
1960
1970
1980
1990
2000

4. Early History (1999) of i-mode (Jeffrey Funk)

- February 1999
  - Started services
  - Offered entertainment contents and micro-payment system
- Four phones available by May 1999
- Growth in screen savers, horoscopes, and ringing tones (monotone) started in summer
  - Created a critical mass of users
  - Drove growth in number of content providers
- One million subscribers by end of August 1999
- Phones with color displays and MIDI (for polyphonic ringing tones) introduced in December 1999/January 2000
- Two million subscribers by end of December 1999
- Ca. 38 million subscribers now
- Usage is independent of region

4. Interaction Between Initially Popular Mobile Internet Services (entertainment & mail) and Market (young people) – continued (Jeffrey Funk)

Entertainment	Young People
Ringing tones, screen savers	Big emphasis on personalizing clothing, bags, wallets, jewelry, hair, and phones
Games	Have always been more popular with young people than others
Exchanging mail	Lots of free time and large variety of friends
Dating Services	Big emphasis on dating

4. Evolution of Market: User Learning (Jeffrey Funk)

- Move from official to unofficial sites
  - 25% of content traffic in Spring 1999 to 50% in September 2000 and still rising
  - Users bookmark the URLs and send them to friends in mail
  - Far more unofficial sites than DoCoMo's data suggests: 50,000 in Oh! New!, 75,000 in Girls Walker, and > 2 million pages created on Magic Island (end of 2002)
- Young users become content developers
  - Digital technology brings down the production cost of contents
  - Mail and SMS culture including personalization of mail with screen savers, ringing tones, photos, short videos
  - Most mail magazines are written by young people. Girls Walker offers 17,000 mail magazines and sends > 1 million/day

4. User and Content Provider Learning (Jeffrey Funk)

- Most non-Entertainment Mail is Opt-in Mail or Spam
  - Small screens make it hard to search for specific information
  - Easier to receive opt-in mail than search for information
- Most popular non-entertainment contents involve mail
  - News summaries including weather alerts
  - Mail magazines on fashion, music, etc.
  - Mobile shopping – music, concert tickets
  - Discount coupons
    - Tsutaya Online (video rental shop) sends > 1 million/day
    - Other retail like clothing and fast food companies
  - Surveys
  - Product information for young people – e.g., cosmetics

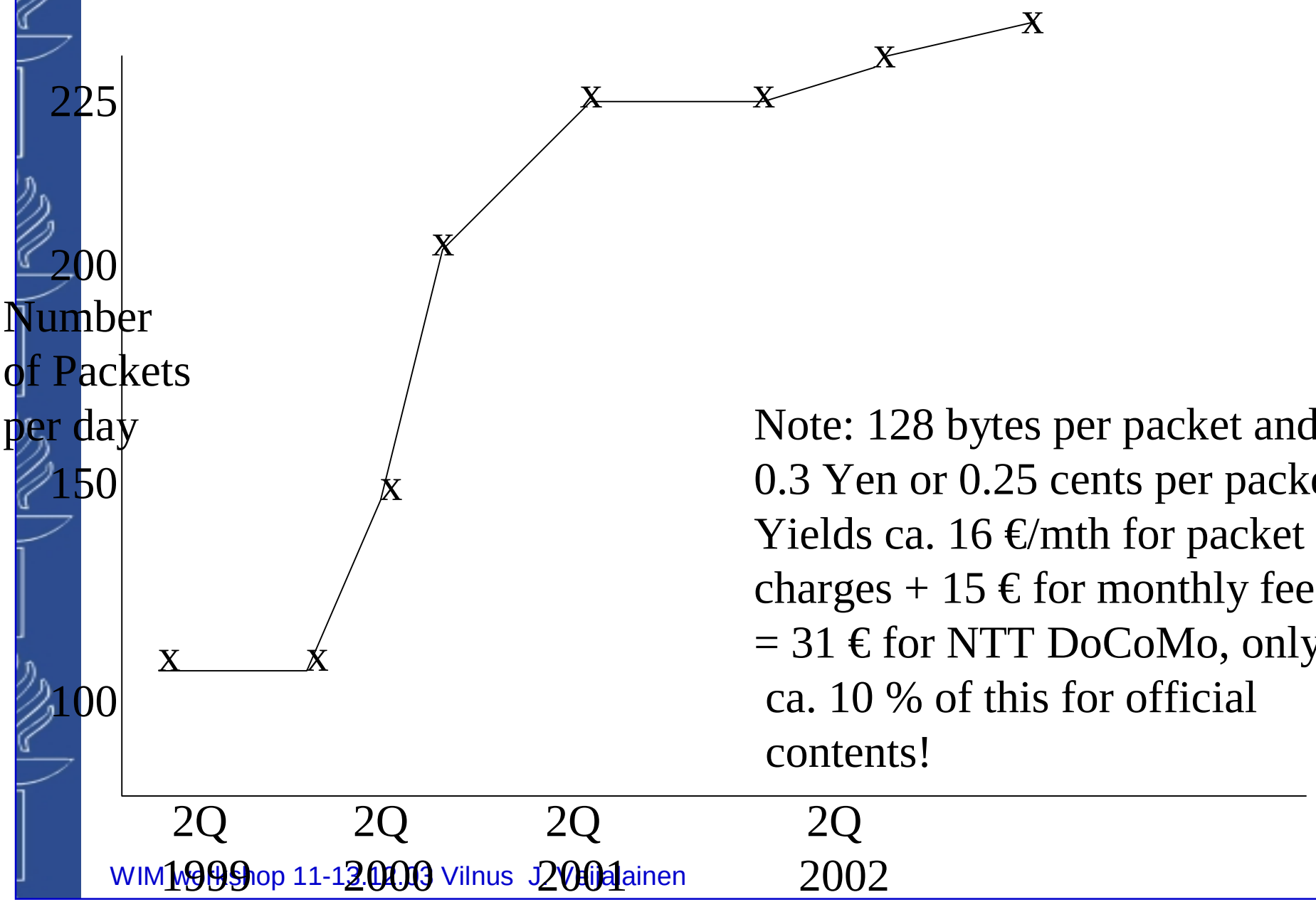
4. Overall Mobile Content (Via Micro-Payment System) Market for 2002 (Billions of Yen) (Jeffrey Funk)

Total market	150 (US$ 1.35 billion)
Ringing tones	80
Screen savers	25-30
Games	15-20
Other entertainment	5-10
News	5-10
Navigation services	2-3
Other contents	10-20

Note: On a monthly basis, the market had grown to 200 billion Yen by August 2003

Note 2: assume 40 mill. Users => 416 Y/mth for contents, I.e. ca. 3 €/mth

4. Packets Downloaded Per i-Mode User Per Day (Jeffrey Funk)



Note: 128 bytes per packet and 0.3 Yen or 0.25 cents per packet Yields ca. 16 €/mth for packet charges + 15 € for monthly fee = 31 € for NTT DoCoMo, only ca. 10 % of this for official contents!

4. B2C business revenues for digital contents and services in Japan

- in general, ca. 75 % for the revenues are gathered by the operator and the rest go to the content providers;
- there are content providers and content creators that actually produce the digital contents; these share the revenues among themselves

4. Multichannel integration (Jeffrey Funk)

- Summary of Market
- Pure Mobile Shopping
  - Music
  - Fashion
- Multi-Channel Integration
  - With catalogues and magazines
  - With radio programs
  - With TV programs
- Payments and Mobile Wallets
- Summary

4. Music market (Jeffrey Funk)

- Tsutaya Online
  - 2.45 Billion Yen in 2002
  - 60% of sales are through mail services followed by recommended products, product rankings
  - Average user is 21 versus 30 on PC site
  - Built up mail services through music information and discount coupon services
- HMV

	stores	PC	mobile
– Pre-release	0	30%	35%
– Top 40/back catalogue	98%	40%	60%
– Deep catalogue	2%	30%	5%

4. Percent of Mobile Payments by Type of Payment (Jeffrey Funk)

Firm	Product	Credit cards	COD	Bank	In-store
Tsutaya	Music/Movies	40%	20%		20%
Pia	Tickets	50%		50%	
Lawson	Music/Movies				Almost 100%
Magaseek	Fashion	50%	50%		
Cyber Wing	Music	>90%			
HMV	Music	58%	30%		12%
Index	Perfume/ Flowers	25%	75%		

4. Summary for mobile shopping market (Jeffrey Funk)

- Mobile shopping market is growing much faster than entertainment contents
  - > 100 billion yen in 2003?
  - > 200 billion yen in 2004?
- Factors driving market
  - User learning
  - New services like those from Net Price
  - Integration with magazines
  - New technologies for integrating magazines and mobile sites
- Future
  - Integration with radio programs and TV stations
  - New technologies and services that promote this integration
  - Mobile wallets that facilitate payments

4. Competing Technologies for mobile payments (J. Funk)

Technology	Phone Require-ments	Speed	Two-Way Commu-nication	Security Advantages	Likely First Application
2D Bar codes	Mail function	Slow	No		Discount Coupons/Loyalty Cards
Infrared	Infrared port	Slow	Yes	Direction-ality exists	Credit card purchases
Non-contact smart cards	Smart card function (IC chip)	Fast	No	Short distance	Transpor-tation

5. Corporate usage of mobile internet (J.Funk)

- First-Stage Systems
  - Accessing PC Mail on mobile phone
  - Secure gateways
  - Examples: delivery companies, taxis
- Second-Stage Systems
  - Groupware
  - Multi-tasking
- Third-Stage Systems: accessing corporate data
  - Maintenance
  - Construction
  - SFA
- New Technologies and Dominant Designs/Standard

5. Growth in Corporate Users for Three Stages of Mobile Intranet Usage (Jeffrey Funk)

Stage	Applications	Number of firms		
		2000	2001	2002
1 Mail				
1.1 Forward	Forward PC mail to phone	6	25	33
1.2 Instructions	Send instructions to phones	5	31	52
1.3 Secure mail server	Forward mail or instructions via secure mail server	6	17	51
2. Groupware	Enable groupware access on mobile phone	22	43	87
3. Access company databases	Access and input sales, product, price, customer, order, and other data	14	37	101

5. Estimated Number and Type of Users (Jeffrey Funk)

- At the end of 2002 (April, 2003)
- Stage 1 users (mail)
  - Net Village: about 500,000
  - Done by self or firm: 1.5 million?
  - Delivery applications: about 100,000?
- Stage 3 users: access corporate data
  - More than 10 firms had >3000 Stage 3 users
  - Total of more than 100,000 in April 2003?
  - Now more than 200,000?
- Usage driven by availability of mobile Internet-compatible phones and innovation in these phones

5. First Stage Systems (Jeffrey Funk)

- Forward PC mail to phones. Problems include:
  - Crowded in-boxes
  - Full mail-boxes generate error messages
- Convert mail to c-HTML pages (Net Village)
  - Java function reduces packet charges, automatically checks for mail, enables file access
  - Problem is expandability to organizations
- Security
  - Second firewall: input password and ID, receive mail (only sent to authorized address), access URL
  - Biometrics: fingerprint scanners

5. Second-Stage Systems (Jeffrey Funk)

- Emergence of PC and Now Mobile Internet-Based Groupware Packages
- Mobile Packages Recognize Whether Phone or PDA
  - Traditional functions like mail, schedules, bulletin boards
  - Mobile specific functions like conducting surveys
- Issues
  - How will groupware evolve into Java-based systems?
  - Construct groupware from Java-based programs or use Java programs to access existing programs
- Multi-tasking
  - How to move easily between content, mail, and voice calls?
  - Short-term solutions include Java-based programs
  - Long-term solutions are better OS-based systems

5. Stage 3 Systems: Maintenance Systems (J.Funk)

- Japan Business Computer Corporation (JBCC)
  - Sends mail to workers in field following customer request
  - Worker accesses additional information through URL
  - Workers update status through URL, forwarded to call center
  - Reduced telecommunication costs and increased call center and worker productivity
- NEC Office Equipment
  - Similar to JBCC's solution
  - Workers can listen to customer's phone call via URL
  - Links to companies that dispose of parts
- Future
  - GPS for choosing worker based on location
  - Camera phones for consultation with experts
  - Groupware for better communication

6. Concluding remarks: Power Brokers in Mobile Internet (J. Funk)

- Microsoft
  - Controls the PC world (partly due to IBM's gift)
  - But Windows doesn't work well on PDAs or phones
- Nokia
  - Chooses what goes into the world's phones
  - But it isn't a leader in mobile Internet-compatible products or standards, lead users are business users
- NTT DoCoMo
  - Leading mobile-Internet service provider in Japan
  - But it is weak outside of Japan and having trouble controlling key interfaces/standards in Japan
- Vodafone
  - Leading service provider in world
  - But does it have engineering expertise to support all key interfaces when DoCoMo is also having trouble doing this?

6. Concluding remarks (J.V)

- What is the role of standardisation?
- Nokia has proposed Mobile Internet Technical Architecture (MITA) Vol.1 – Vol.3 in 2002; what will the impact be?
- Open mobile alliance founded 2002 to homogenize higher layers
- how much impact/business will roaming have on business/architecture?
- What is the impact of video phones on TV as contents provider (camera is everywehere!)
- do mobile and ”normal” Internet converge to one or will there be different access networks and SC1 and SC2 also in the future?
- will the existing MI islands become interoperable (on the basis of WAP 2.x)?