Mobile Commerce Regulatory Frameworks under Digital Convergence

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- Vertical and horizontal technical architecture
- Regulatory structures for wireless arena
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Digital convergence

- Digital Convergence transformative for several industries
  - Mobile terminals over 2 billion; hundreds of millions Internet-enabled (i.e. i-Mode, WAP, WWW servers and support email)
  - VoIP,Mobile-TV: How much revenue user will generate on different channels? Are users willing to invest money and time to new wireless channels? Where are they taken from?
- Regulation limits and enables business; wrong policies inhibit, right ones foster development

Terminal and network convergence phenomena

- Currently, the wireless terminals run several protocol stacks (2G, 3G, WiFi, digi-TV, (analog) Radio, GPS, Bluetooth, Infrared…), i.e. they are the concentration point of convergence currently
- Through them, a high-end terminal gains the capability to receive contents from Internet servers, other users, Radio stations, TV-stations, and positioning information from GPS satellites –and can send the contents it itself generates (video and voice streams, images, etc.) to the other entities (except of course GPS satellites)

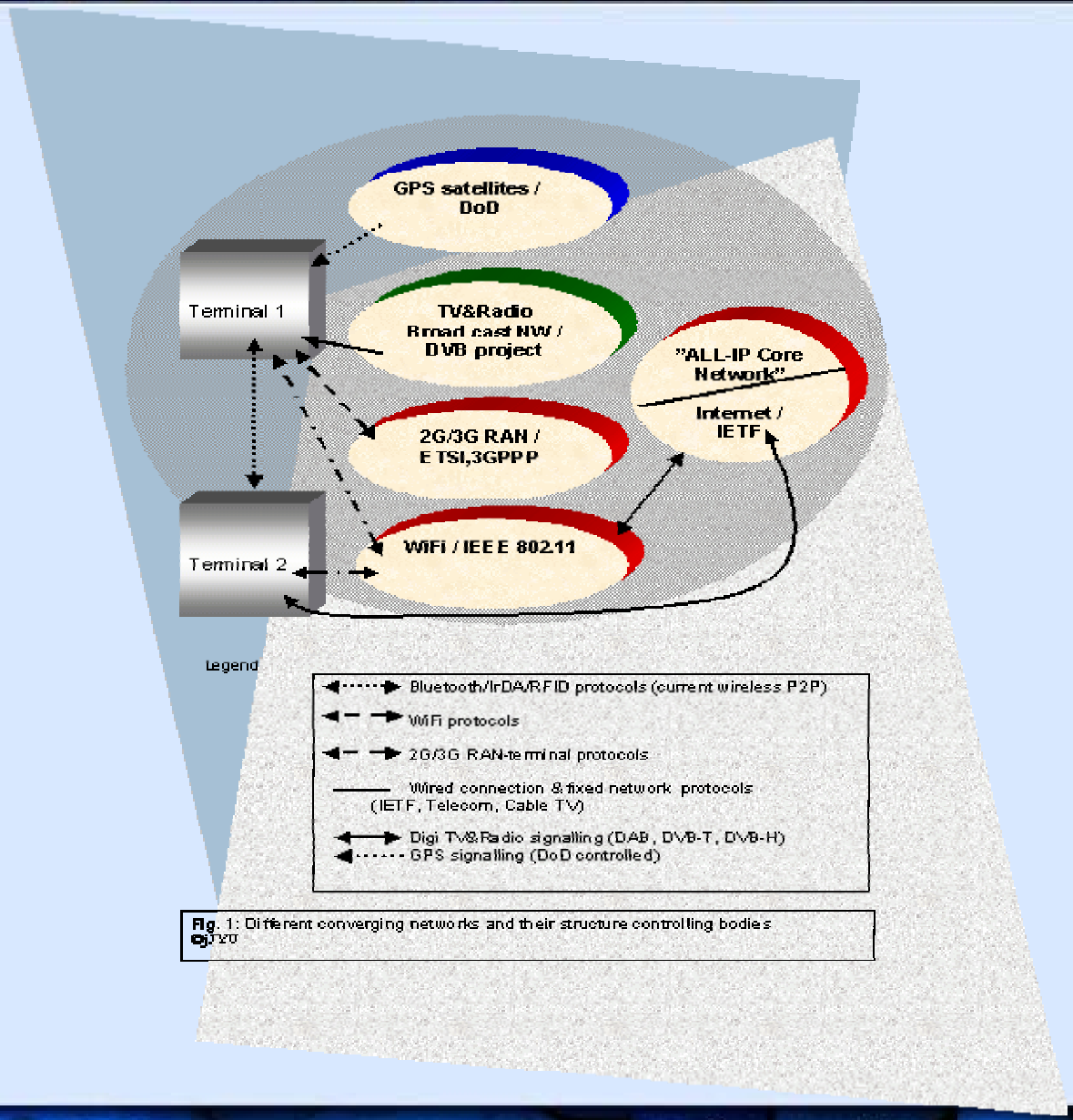
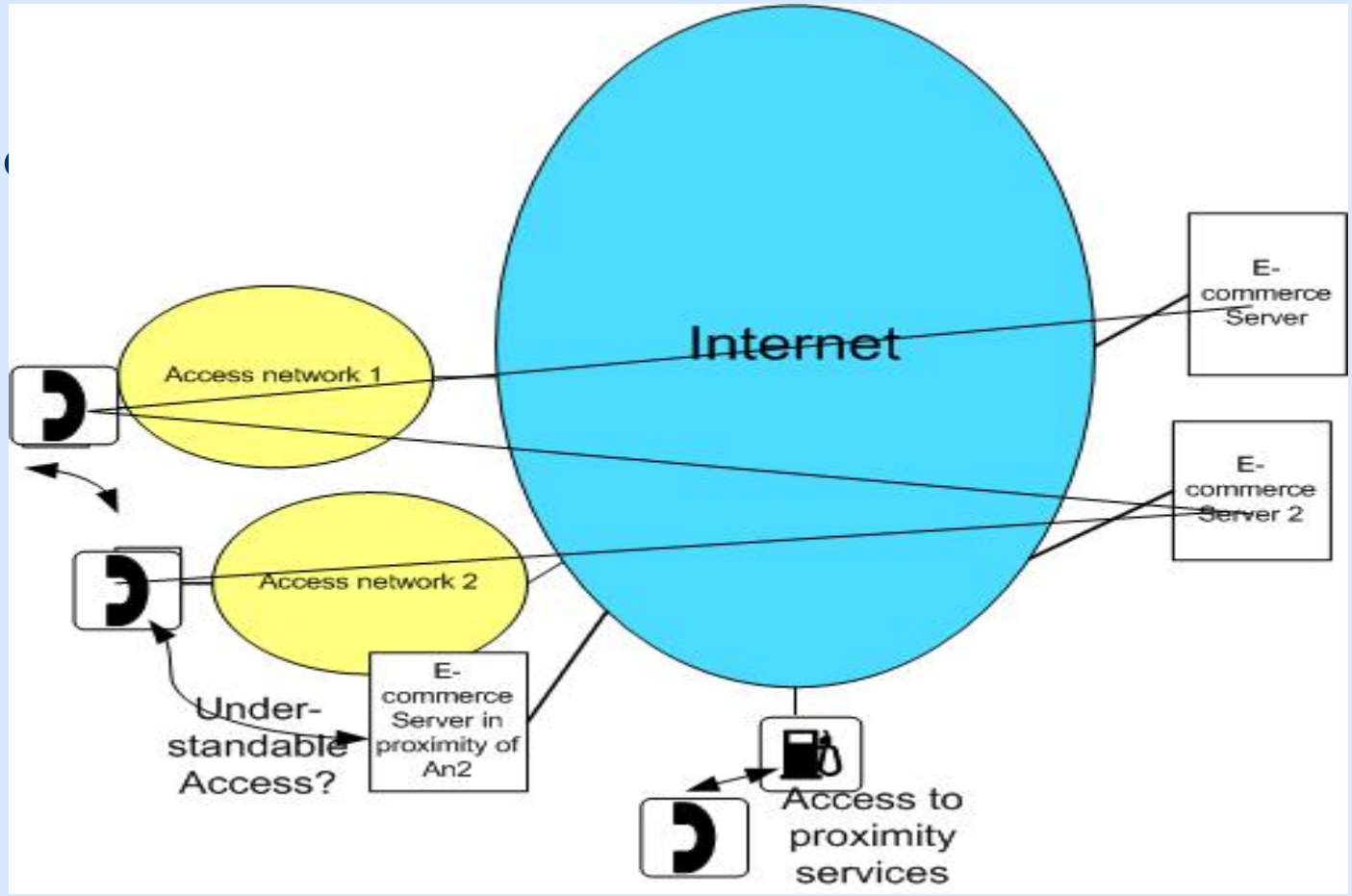


Fig. 1: Different converging networks and their structure controlling bodies

Necessary technical basis for M-commerce

- Mobile commerce is viewed here as a sub-activity or subset of E-commerce, where the E-commerce transactions are performed using a mobile terminal (laptop, telecom terminal, or PDA) over a wireless link
- The link is established between a WiFI access point or base station of 2G/3G network and the terminal or between it and another device running BT or IrR stack or a contactless RFID reader (short-range link)
- Transactions carry economic value between actors

Reachability of E-commerce servers for a terminal



Necessary technical basis for M-commerce

- E-commerce and also Mobile commerce requires techically more than just access to wireless network, it requires a complete protocol stack up to application layer, including authentication, encryption, and suitable content formats for the data
- Because E-commerce is based on TCP/IP on Network and Transport layers, M-commerce is often also based on TCP/IP, though TCP should be adapted to perform better over a wireless links in WiFi and 2G/3G networks
- Over the short-range links other protocol stacks (e.g. IrDA) are used and these links are used especially for POS payments

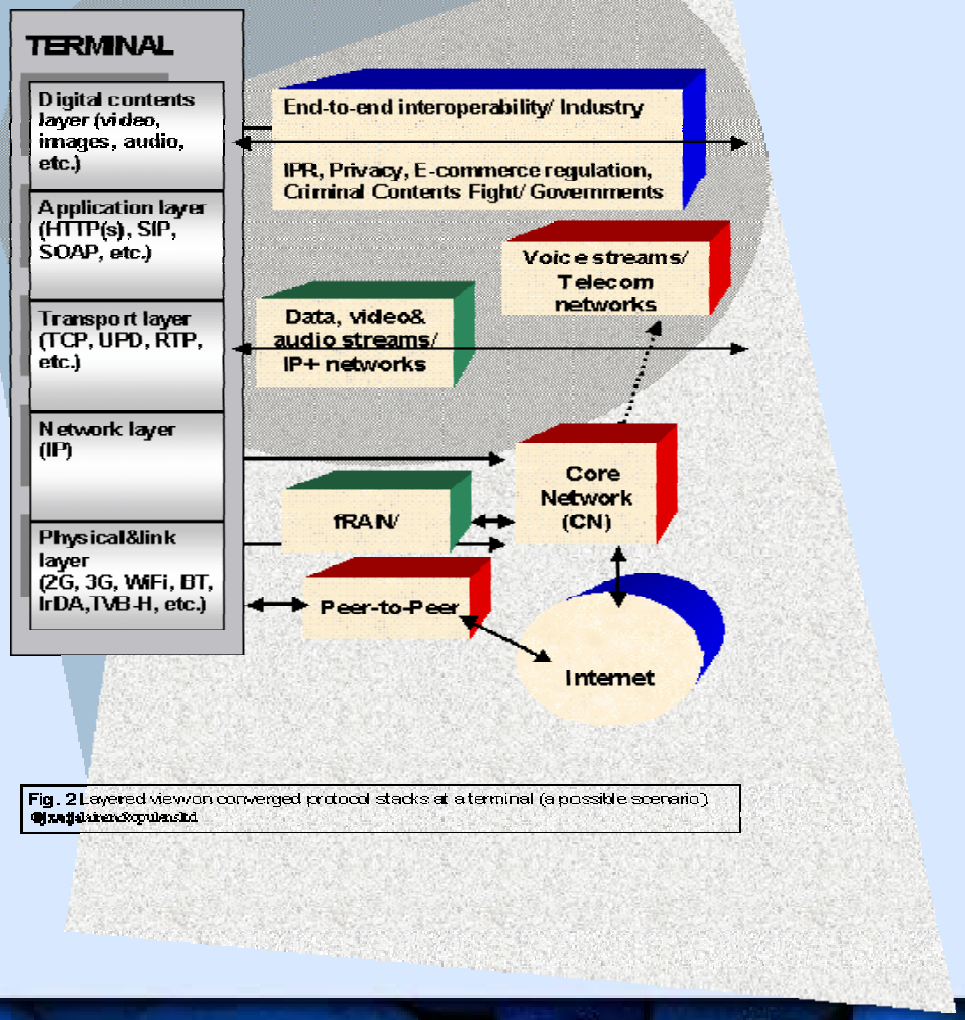
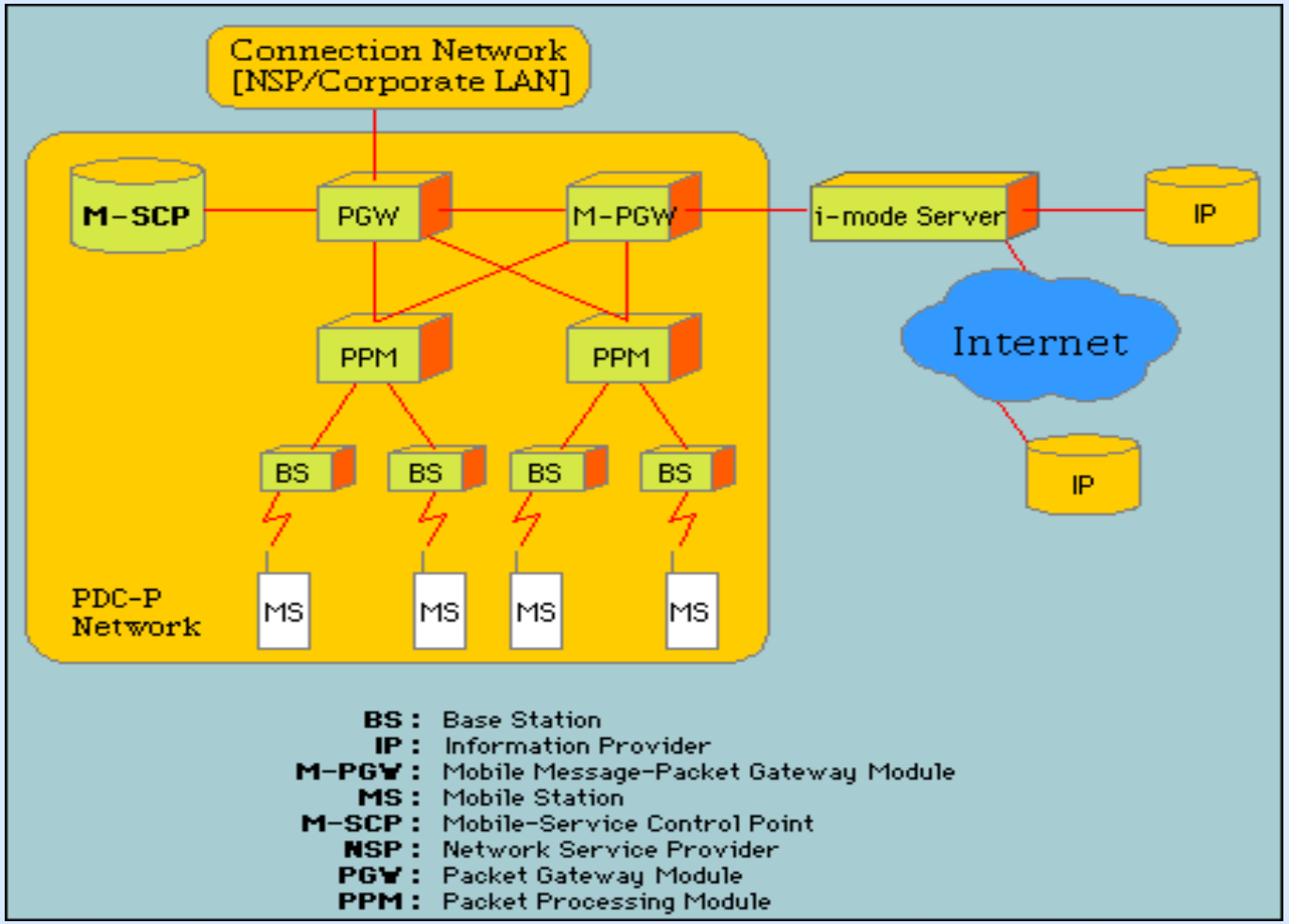
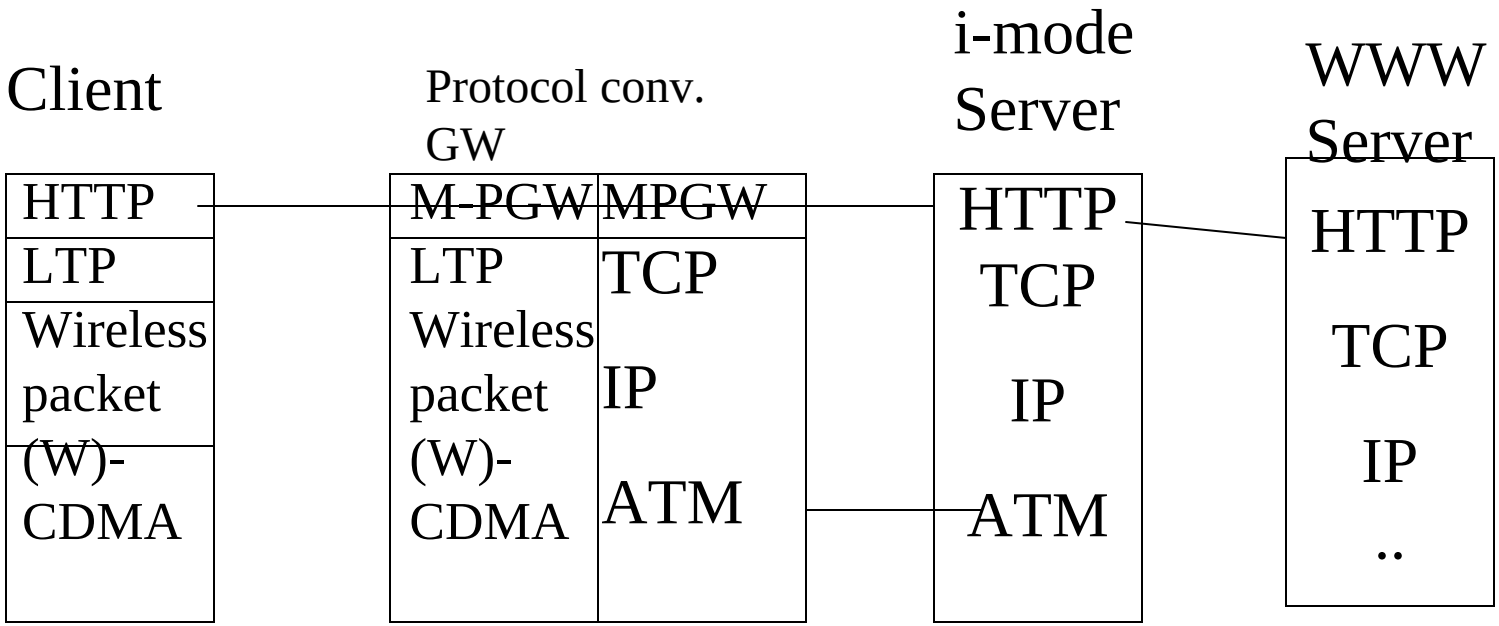


Fig. 2 Layered view on converged protocol stacks at a terminal (a possible scenario)

iMode horizontal architecture



iMode Protocol stack architecture:



Regulation on different protocol layers

- regulation sets limits and enables business activities; wrong policies inhibit development
- Industry Regulation is done by different actors on different protocol layers (ETSI, IETF, industry consortia like OMA) and authority regulation by national governments, EU, etc.)

Structure of regulative framework in a region/country

- TV- networks, mobile networks, fixed networks can be regulated by separate governmental bodies, in addition, consumer market, including E-commerce is regulated often by another governmental body
- So the organisation of the governmental regulation framework can be a source of conflicts, unless these coordinate their regulatory actions
- In general, network convergence creates push to unite all governmental bodies that regulate various wireless and wireline networks

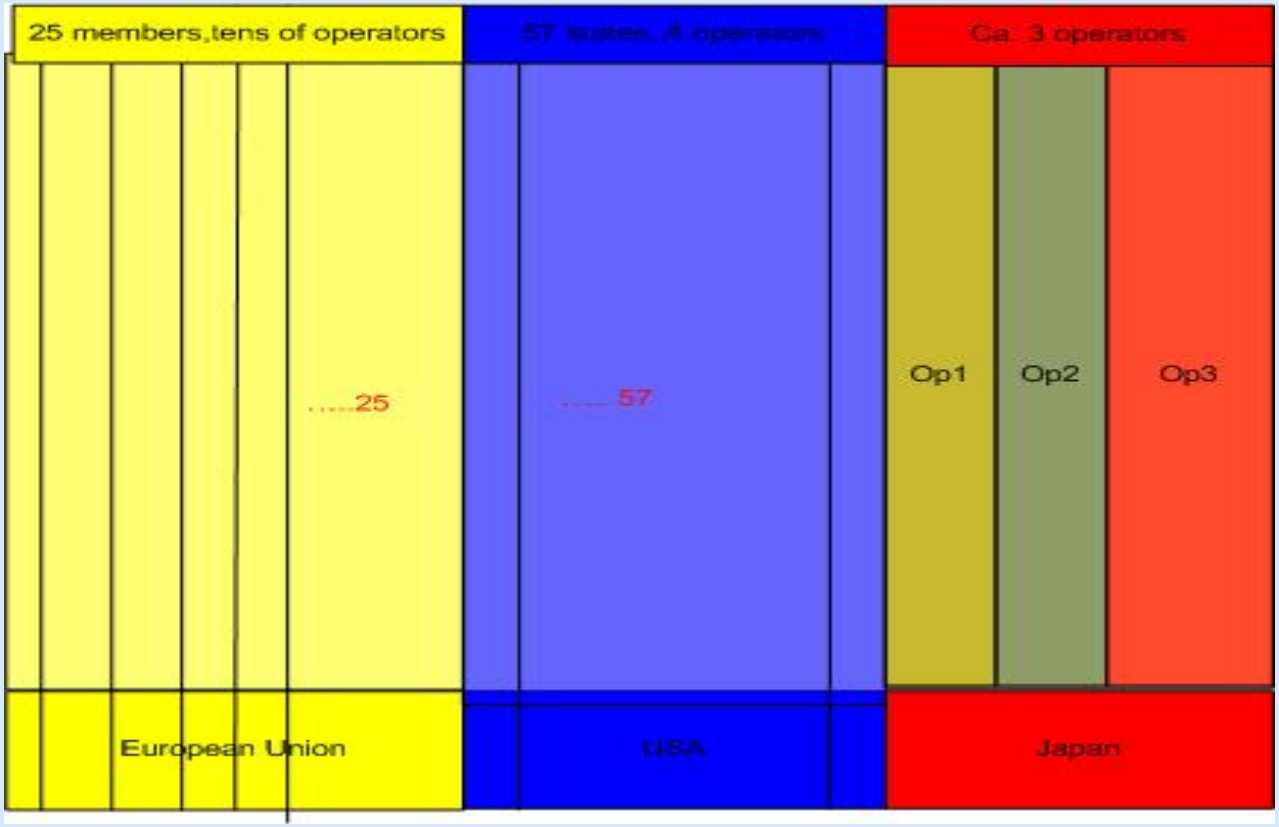
Regulation on different protocol layers

- Authorities in various countries or governmental organisations like EU usually select the technologies, i.e. dejure or defacto standards that are then authorisied to be used within the country; examples include GSM standards for 2G, W-CDMA for 3G, PAL/SECAM/NTSC for analog TV, DVB-X for digital TV, etc.
- The usage of most radio frequencies is lisenced, i.e. a special permission is required from authorities; non-licensed frequencies can be used without permission

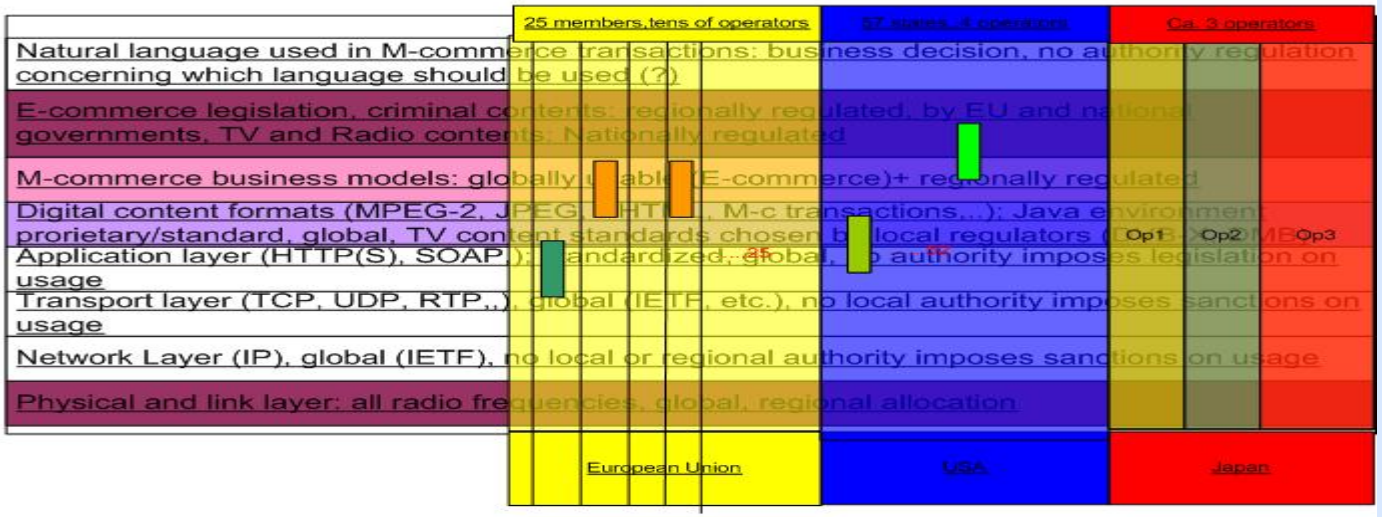
Layers necessary for M-commerce schematically

Natural language used in M-commerce transactions: business decision, no authority regulation concerning which language should be used (?)
E-commerce legislation, criminal contents: regionally regulated, by EU and national governments, TV and Radio contents: Nationally regulated
M-commerce business models: globally usable (E-commerce)+ regionally regulated
Digital content formats (MPEG-2, JPEG, XHTML, M-c transactions,..); Java environment prorietary/standard, global, TV content standards chosen by local regulators (DVB-X, DMB)
Application layer (HTTP(S), SOAP,); standardized, global, no authority imposes legislation on usage
Transport layer (TCP, UDP, RTP,,), global (IETF, etc.), no local authority imposes sanctions on usage
Network Layer (IP), global (IETF), no local or regional authority imposes sanctions on usage
Physical and link layer: all radio frequencies, global, regional allocation

Geographic division of the world into regulatory frameworks (main areas)



Layers vs. regions matrix



Innovations, industry and market regulation

- The industry regulation (standards) and authority regulation (laws etc) determine the theoretical market potential of a certain deployed technology; regulation is targeted towards certain deployed socio-technical systems (PLMN, TV networks, etc.)
- If technologies collide (Mobile TV=TV and mobile terminal) this causes perhaps regulation conflict and in any case market convergence phenomena; how do the users (consumers) react to new channels? Can revenues on all channels grow? Under which conditions? If not, which one will loose?

Mobile TV regulation, M-commerce over mobile-TV

- Is a telecom terminal or PDA a TV set in a regulatory sense, or primarily a mobile telecom terminal if it is able to receive digital TV program? Should it be regulated both as a TV and as a mobile network terminal?
- In the last case, the regulatory regimes should evidently be streamlined
- Does the possible M-commerce content mediated over mobile TV channels require new thinking and rules? Is the content (.e.g video clips) already covered by Pay-TV or M-commerce regulation?

Innovations, industry and market regulation and user time

- The user population size and the time it is willing and able to allocate to various technical channels determines the overall size of the wireless market; in the next picture this is shown as outer pipe
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Voice-over IP (VoIP)

- Technically VoIP is not a big leap, just encoding the voice stream is changed and the protocol stack used is replaced with another one (IP based); one could even say that using IP networks that do not guarantee QoS is a step backwards in voice quality
- But the issue is cost savings for customers, because they can avoid to use the revenue generation model of wireless and wireline telecom operators
- Another issue is emergency services that should be obtainable from a public telecom network

Conclusions

- M-commerce is regulated as E-commerce by authorities and it requires a complex protocol stack whose levels are standardized by international bodies; not all levels are regulated by authorities and incompabilities can easily arise
- It requires further analysis, how the regional authority regulation and globally defined standards work together and which bodies control exactly e.g. the emerging mobile TV and other content formats and in general the different parts of the ecology
- From roaming customer point of view a necessary condition that he or she can perform M-commerce transactions is the compatibility of his or her terminal from physical layer to the used language