Telecom network migration to IP and its impact on the future of telecommunications

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The current situation in developed economies

Ubiquitous telecom network for person to person communication

- Primary access mean to the Internet for private users
- Volume of data traffic transported over the telecom infrastructure in many countries overstepped the one used for voice but is still by far dominantly from the voice traffic
- Still, an incentive for convergence at transport level between voice and data services exist in the short to medium term
- But at what cost? For what services? And, most important, how the new network looks like?
On the opposite in developing economies

Lack of basic telecom infrastructure

- Lack of access to the Internet mainly as a consequence of undeveloped telecom infrastructure
  - Telecom and Digital divide closely related
- IP Telephony seen as a threat to revenue due to heavy reliance on settlement rates drawn from International traffic
  - Consequence of limited national/local traffic due to lack of telecom network development
- No way out from this situation without **improving access** to network
  - For what services to justify investment?
  - Leapfrog to IP before or simultaneously as in developing countries
Some of Today’s Assumptions

- **IP** is “the future” technology for world-wide networks used for all kinds of communication (person-to-person, data, multimedia,..)

- **IP** networks’ expansion help reduce the “digital divide”

- **IP** telephony is more cost-efficient than legacy TDM

- **IP** telephony should not fall under the current telecom regulation framework
Extra thought is needed

- Internet and IP network technology certainly offer great opportunities for new services and new development prospects

**BUT, prior to tearing down the “old world” of telephony, we could usefully:**

- *Compare its model with the data network model (from which IP technology originated)*

- *Highlight differences between both models beyond the specifics of the transport technology*
**Data Networks**

**Two-party** communication model  
(client/server or peer-to-peer)

Network engines focus on transport of user streams. Control stream exchanged between communication applications hosted at users premises with the help of servers that do not interfere with transport level.

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**Telecom Networks**

**Three-party** communication model  
(caller-network-called)

Network engines relay user service request for a communication application under their control. Transport of user stream closely linked with the communication application control.
Comparison Framework (2)

Data Networks

No direct control by network over the communication except access rights

Network engines only control the user access rights to send data over the network. Application workability delegated to appropriate servers (if any) on a per-application basis.

Telecom Networks

Communication controlled (managed) by the network

Network engines control the user access based on his access right to the specific communication application provided by the network. User streams only sent over the network when access to the application is enabled.
Data Networks

Communicating users agree on which communication protocol

End-to-end Protocol P1 agreed between users on a per-application basis. P1 may also involve the interaction with the server supporting that specific communication application.

 Telecom Networks

Communication protocols are network specific and transparent to users

Protocol P1 invoked by end-user to express/receive communication requests to/from the network. Protocol P2 is internal to the network and used to relay communication requests between network entities.
Data Networks
User-defined **QoS constraints** provided to the network

Service Level Agreement (SLA) determine the quality of user traffic that can be handled both at user/network interfaces and between sub-networks. SLA are independent from any specific application. Overall resulting quality of service between end-users tributary of correct routing over appropriate links.

Telecom Networks
**QoS constraints** of a communication known and guaranteed by the network

User Network Interface (UNI) allows a user to request a network service from a sub-network operator. Network to network Interfaces (NNI) allow sub-networks to relay service requests. Acceptance of a request at UNI or NNI level involves appropriate resource reservation for its proper completion up to the next hop.
Data Networks

Communication can be universal but no network interconnect mandatory at service level

End-users interconnection ensured on an application per-application basis through appropriate servers. Transport-level interconnection is a necessary but not sufficient condition for application level one.

Telecom Networks

Universality of communication service through interconnect agreements between sub-network operators

End-users interconnection ensured because of the mere existence of interconnect agreement between their respective sub-network operators. Application and transport level interconnections are closely related.
Data Networks

Charging based on flat rate or volume of transported data

Sub-Network operator levies a fee to end-users corresponding to the actual amount of traffic sent irrespective of any application. Charge depends only on the quality of the SLA.

Compensation between sub-network operators based on volume of transported data not on the nature of the supported applications.

Telecom Networks

Charging based on usage of the communication service

Sub-Network operator levies a fee to end-users corresponding to the services used in a way not directly related to the amount of traffic they had generated (end-user may not even be aware of it).

Compensation between operators based on service components relayed in each respective direction.

Time based charging is strictly a matter of service offering - not technology dependent
Convergence will occur only if it allows new services and not - still to be proven “reduced costs” - for equivalent services!

Future converged networks would still be economically based on the provision of person-to-person communication services.

Gradual access improvement and diversification plus migration of the network transport infrastructure financed by

- converged voice and data service in the short term
- new breed of multimedia services in the mid/long term
- still keeping interoperability with legacy infrastructure to ensure universal communication service.
What a converged telecom network looks like

- Offers a diversified - wireline and wireless - high bandwidth and in native packet mode access to the network.

- Offers at least multimedia inter-personal communication services to its subscribers

- Allows provision of “third-party” brokered - i.e., with good quality - services as well as “free” Internet services where operator role is limited to transport provision
What might happen in the coming years

- Development of new access technologies (or upgrade of fixed access through xDSL) to provide broadband access
  - possible leapfrog by developing countries if revenues drawn from voice service cover the investment

- Gradual migration of core network transport infrastructure to a packet (or IP) technology

- Leverage by incumbents and new comers on improved access to offer bundled data and telecom services a la telecom model way

- Gradual deployment of multimedia services when access and network migration over a packet transport completed
Conclusions

- Networks are not determined by their technology but by the services they do provide and the way they provide them!
- IP or packet transport technology will progressively integrate telecommunication networks but...
- The upcoming “next-generation” telecommunication networks will still be based on person to person communication services

The path to “next-generation” networks is technically and economically feasible through the telecom model