Mobile Internet Oriented 3G Teleco 2.0

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Abstract:
Mobile Internet will be the killer application of 3G. For the mobile Internet, the business model of telecom operators has to evolve to Teleco2.0. IP Multimedia Subsystem (IMS) will be used mainly for VIP and enterprise customers. Mass-oriented entertainment and new media services will be based on the Intelligent Node Overlay Node (INON)/Distributed Service Network (DSN). The core network will be flat, with an evolution route from Internet High Speed Packet Access (I-HSPA) to System Architecture Evolution (SAE), and even the Internet can be used as the core network. The low-cost mobile phone can be accessed to HTTP Internet by using "client end software + portal" model with cloud computing. Flat rate will be the only fee model to be accepted by customers, and cheap and reasonable prices will contribute to the development of mobile Internet.

It is a subversive reform from Teleco 1.0 to Teleco 2.0. The operation philosophy, operation mode, charging mode, and network architecture will change. Most carriers are not ready for the reform. For carriers, impacted by internet, the only bright way is turning to the mobile Internet[1] and to transit to Teleco 2.0.

1 From IMS to INON/DSN

Currently, the 2G/3G network of mobile carriers uses the IP/MPLS-based manageable IP core network. On the IP core network, the IMS platform is constructed to provide various applications. The structure constructs a "Walled Garden" for carriers and provides network basis for dominant industrial chain. It inherits the Teleco1.0 mode, but cannot meet the requirements of mobile internet-oriented Teleco 2.0.

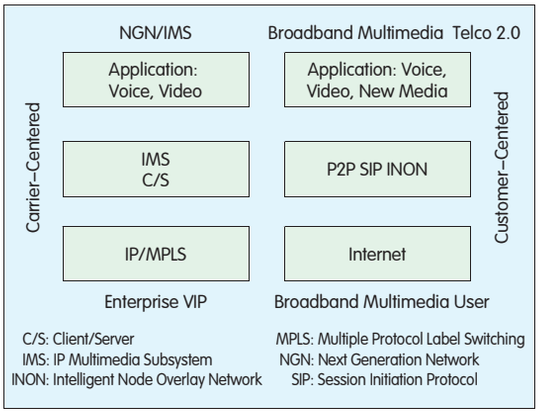
The enclosed structure of the IMS centralized control provides service for VIP enterprise customers who require QoS and security. It is not suitable for open mobile internet. The features of open, autonomy, and omnipresence of Internet provide broad space for mass entertainment and new media. It is a real customer-centered mode.

The value proposition of the network is determined by the operation mode, namely, the generation of digital content, distribution, and delivery method. For traditional broadcast network, according to the Sarnoff law, the network value is proportional to the number of audience. For Internet, the interactive network, according to the Metcalfe law, the network value is proportional to the square connected nodes. The development of Internet community service increases the dimension of creating values. According to the reed law, with the increase of community users, the revenue of community group services increases geometrically. The network value is changing in to the state expressed by Reed law from Sarnoff law and Metcalfe law. Only the openness of the network can reflect the maximum value.

In the last few years, P2P-based VoIP telephone, content download, and stream media are developing rapidly. P2P has become the major mode of providing audio and video services in the internet. The P2P service is running on the public Internet in the mode of overlay network. IMS uses client/server architecture and thus does not support the P2P service. To manage the P2P service, Intelligent Node Overlay Network (INON) is developed. Paralleling with IMS, the INON distributed management platform should created in the public Internet to provide supporting environment[2], as shown in Figure 1.

The INON network is a new overlay network technology integrating Resilient Overlay Network (RON) technology, which covers the IP core network, and Distributed Hash Table (DHT). It includes automatic networking, network resource management, and route optimization technologies. The basic structure is that: TCP/IP protocol remains unchanged; the original layer 3 becomes layer 3-, on which, an INON serves as layer 3+. On the distributed management platform, services including traffic monitoring, traffic control, QoS, Antivirus, and security are provided.

Another task of an INON is to provide supporting environment for various P2P applications. It provides universal supporting environment for various P2P services adopting different protocols and software. It mainly provides P2P CDN and P2P SIP. The INON network is shown in Figure 2.



▲Figure 1. Creating a distributed management system in the overlay network mode.

China Mobile Company observed the demands of Teleco 2.0 and the limitations of IMS. It started to launch the research for Wireless Internet/IP Service Environment (WIISE) and released Distributed Service Network (DSN) Whitepaper[3]. Paralleling with the IMS on manageable IP network, China Mobile started the research for creating DSN (equivalent to preceding INON) on the public mobile internet. The key of developing DSN is to provide distributed management and supporting environment to face the demands of future mobile Internet and new network media. This conforms to the development trend and seizes the opportunities.

The DSN concept is evolving. Remaining the openness of the Internet is very importan. DNS should support various applications in the Internet. The focus is to encourage and support inexhaustible applications in the Internet, rather than to develop new application. By doing this, a healthy industry chain can be formed. In the construction of 3G network, some carriers think that the IMS is insufficient. Actually, it is wrong despite of the extra investment.

2 Flat Core Network

The network architecture of 3G network including TD–SCDMA and WCDMA deployed in China follows the 3GPP R99 structure, namely, the uplink/downlink data of base stations is connected to the service platform through Radio Network Controller (RNC) and Serving GPRS Support Node (SGSN).The network structure requires that each NE should unpack–encapsulate–forward packets[4]. When the empty interface has the High Speed Packet Access (HSPA) capability, the HSPA data converged from thousands of communities requires higher processing capability from each NE, especially RNC.

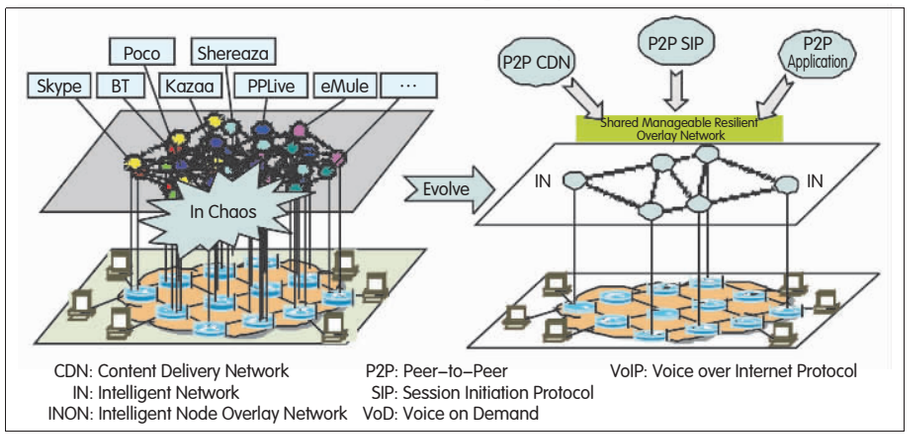
Take the maximum rate 14.4 Mbit/s of HSDPA as an example, a HSDPA network of 1,500 sectors generates the data bulk of 21.6 Gbit/s. Currently, the data throughput of RNC is only 1 Gbit/s. The 3G network and the 2G network of carriers share a core network, whose bandwidth and data processing capability cannot meet the requirements of HSPA high data rate. When the data load increases dramatically, the carriers have to face the huge pressure of expanding RNC/SGSN. In addition, unpacking packets at each node causes extra delay for each node. As a result, longer network delay is generated.

For the mobile Internet applications, the hierarchical network structure is not necessary. Flat network can simplify the devices and reduce the cost, at the same time, shorten the delay. I–HSPA emerges as required. Through the architecture, the base stations are connected to the GGSN (gateway to the Internet and data service) node via Gi/Gn interface[5]. The principle of I–HSPA is illustrated in Figure 3.

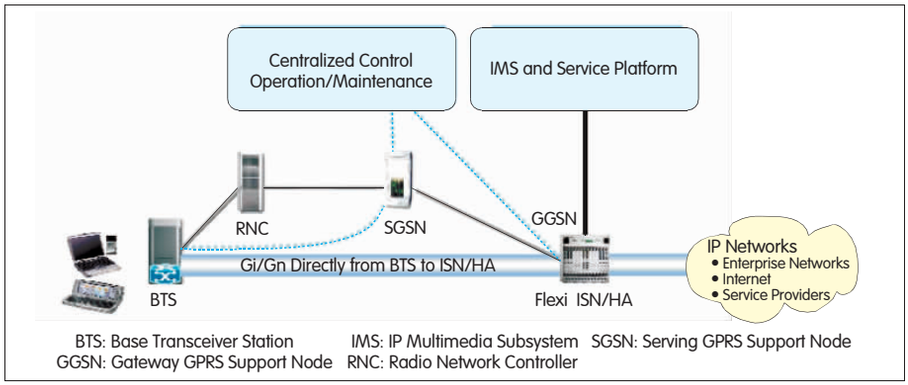
The direct link can create channels for user data flow to bypass RNC and SGSN of traditional architecture, which saves the transmission cost. It can also save the investment for expanding the RNC/SGSN when the data load increases significantly. In addition, for Gi/Gn, the MAN Ethernet provide the Ethernet private line, whose cost is far lower than that of E1/T1. As a result, the cost for creating transmission network is significantly reduced. At the same time, the transmission path is reduced. Consequently, the delay is also shortened. The Return Transmission Time (RTT) can be reduced to less than 25ms. The flat network is further demonstrated in LTE/SAE.

Both I–HSPA and SAE retain a manageable IP core network. The access network connecting the base station and the Evolved Packet Core (EPC) network connecting the gateway and MME/UPA are the manageable private network of mobile carriers. The core network gateway is connected to the Internet through the SGi interface of the access gateway. The mobile carriers provide various applications on the IP/MPLS based manageable IP core network EPC through the IMS platform. The structure constructs a "Walled Garden" for carriers and provides network basis for dominant industrial chain. It inherits the Teleco1.0 mode, but cannot meet the requirements of mobile internet–oriented Teleco 2.0.

Orienting the mobile internet, the most simple and effective method of the network architecture is that the base station directly accesses the internet. Do not reserve the manageable IP core network EPC. Put the mobility management function to the internet. The B structure of WiMAX NRM R1 is closest to this structure. In B structure, ASN gateway is not used. The function is



▲Figure 2. P2P–based INON.



▲Figure 3. Packet–optimized I–HSPA solution.

implemented by the switch and router on the internet. Unfortunately, in order to getting close to the cell mobile communication because of the 3G network, WiMAX uses C structure similar to LTE. ASN gateway and manageable core network (ASN and CSN) are reserved. It uses IMS to provide services. This drops its advantages[6].

3 Portal Plus Client Software to Cloud Computing

Owing to small screen and weak computing capability, mobile phones can only access limited WAP websites and cannot access millions of HTTP websites. This limits the applications. Some high–end smart phones including iPhone can access HTTP websites. But owing to the small screen size and the sliding window mode, it is not convenient to view HTTP websites. The Portal plus Client mode changes the situation, which is significant to the development of mobile internet. The portal websites provide the capability of navigation, protocol, and format conversion. By downloading and installing the client software, the customer can browse WAP websites and log in to browse HTTP websites, viewing the format suitable for mobile phones. In addition to watching the WAP video programs, you can also watch the video contents in the HTTP video websites. Various Web2.0 applications are supported. Major problems of mobile phone surfing are solved. UCWEB is the most successful portal website in China. In 2008, the number of installed and activated clients reaches 60 million.

Through this mode, more computing power is transferred from the mobile phone to the network side. With the increase of mobile Internet users and the broadband video services, the requirements for the protocol conversion, format conversion, and content storage capability of the portal website are dramatically increasing. The solution is to adopt cloud computing platform. The cloud computing platform also provides the INON/DSN function mentioned previously to provide supporting environment for the mobile internet. For carriers, it is important to construct the supporting environment.

Some mobile phones do not have the corresponding supported clients or the users do not know how to download and install client software. Therefore, carriers should customize or encourage low–cost high–performance mobile phones, in which, client software should be pre–installed to provide "push–to–surf" service. This can improve the competitiveness and promote the progress of mobile internet. Thereby, promote the development of 3G network.

4 Flat Rate

Even in the mobile Internet era, it is profitable for carriers to provide basic transmission services. Up to 2011, if the number of mobile Internet users of China Mobile reaches 100 million, assume the access fee of each user is 50 yuan, the annual revenue will come to 60 billion yuan.

Practically, the acceptable charging mode is flat rate. The broadband service grows rapidly owing to the flat rate. The charging mode is also suitable for mobile internet. In 2006, Hutchison–whampoa first provided the flat rate for the access service. One year later, the flat rate service spreads over Europe and America: the traffic of mobile Internet increases sharply. Currently, telecom carriers do not care the impact of Skype VoIP service. Carriers in Europe and America allow flat rate users of data service to use the Skype phone. With the deployment of 3G HSPA, the capacity increases significantly. The decreasing broadband cost makes flat rate possible. If the mobile phone surfing can lower the tariff to RMB 20 yuan per month (for 2GB traffic), or provide a package with voice service, the mobile Internet in China will grow more rapidly. For the surfing of laptop computer, the flat rate of RMB 100 yuan without traffic limit is acceptable for most users. Presently, the price standard stimulated by three major carriers is still too high, which is not attractive enough for users and thus cannot promote the rapid development of mobile Internet.

Mobile Internet is the trend of network development. The one who turns to mobile Internet first can win the competition in the future, as a proverb says: trend–adaptive one flourishes; opportunity–seizer will be the king.

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Biography

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