

FMC in China, especially in bearer layer convergence

My topic is “Convergence in China”, which mainly shows the convergence practices and concerns in China.

From a long-term view, IMS/NGN is the tendency of FMC, and all of Chinese operators are very willing to follow up and process R&D and application testing in order to accelerate IMS/NGN technologies to be matured, here I temporarily call these developing convergence constructing areas “soft-construction”, such as service and core network convergence experiment, and the government regulatory etc. Although soft-construction is absolutely necessary to operators, the constructing of IP/MPLS multi-services convergent bearer network, here I temporarily call it “hard-construction”, is the most important aspect in reducing operators’ CAPEX and OPEX. The reasons are as follows:

1) NGN is based on the managed IP bearer network, i.e. IP/MPLS multi-services convergent bearer network is the solid foundation of NGN;

2) The driving force of convergence is customers’ service requirements, but the convergent service experience can be achieved by service platform convergence, not rely on the core network convergence.

3) The constructing period and the investment of converged core network is only a little part in the entire convergence network.

4) To Chinese operators, the construction of IP/MPLS bearer network is not only difficult but also emergent. Because Chinese operators must confront the very large-scale bearer network (to meet the coverage need, must deploy over one thousand routing POPs) and resolve the emergent bearing problems of multiple existing carrier-class services, such as 3G, softswitch-based NGN, IPTV and video monitoring services etc.

So in the process of convergence deploying, I think the most important and the first task is to well build the shared bit-pipe for NGN and 3G. Afterwards, the following job is the test and deployment of the convergent core network and service platforms with the mature of technologies and equipments.

Currently, the main operators have constructed the dedicated IP/MPLS bearer network one by one, such as IP mobile dedicated bearer network of China Mobile, CN2 of China Telecom and NGN/3G bearer network of China Netcom. Before constructing the IP/MPLS bearer network, we must evaluate the relationship between IP/MPLS bearer network and IP service network, all of Chinese operators have chosen double networks strategy, i.e. the legacy IP network still provide the Internet-based broadband services, and construct a new IP/MPLS bearer network to act as the convergence bearer network for FMC.

It is very necessary to refer to the designing idea of TDM networks when we plan the flexible IP/MPLS multi-services convergent bearer network. It will enable high transfer efficiency, balanced and adjustable traffic distribution, and controllable fault influence. According to our experiences, four vital challenges should be faced:

1) Topology and traffic model. Both of them are relative to the scale and traffic distribution of the network. For a large-scale IP/MPLS bearer network, both IP routing and MPLS routing should be verified carefully. Furthermore, to the era of IMS/FMC, the traffic would be the mixed model of P2P and C/S, and then the IP/MPLS bearer network must bear the vertical and horizontal traffic concurrently. So we should establish a definite traffic path in both normal and abnormal conditions, to ensure that the network oscillation could be controlled in a minimum range in the case of any abnormality, and core traffic should not be transferred via aggregate nodes, aggregate traffic should not be transferred via access nodes etc.

2) QoS. Currently, other than the over-provisioned network bandwidth strategy, we also adopt the MPLS TE and Differserv model to classify the services less than 8 classes. But with the emergence of diverse services, how to classify and schedule these services is still an unresolved problem, maybe the last resort is the RACS/NASS architecture being established by ITU-T and TISPAN.

3) Reliability. To achieve the 99.999% reliability, we should deploy GR/NSF (Graceful Restart/Non-Stop Forwarding), fast routing convergence and TE/IP/VPN FRR, and combined with BFD (Bidirectional Forwarding Detection), the switchover time can be fallen down to 50ms.

4) Security. We should seek after the full-rounded network security mechanism; divide the network into different security areas to ensure operators' network can be safely isolated from user access network.

Finally, let's see other FMC practices and concerns in China.

1) All of Chinese operators are in transforming period. Since transformation is a persistent innovation process, transformation need converged network to reduce cost, increase income and optimize resource management. Part of Chinese operators have been constructed service networks over thirty, so one converged IP/MPLS multi-services bearer network and several converged service platforms should be the good choice to solve the contradiction between the cost and diverse services.

2) Softswitch can't be overstepped in China for a long period; IMS-based network convergence must reduce the influence on existing softswitch-based networks and services.

- Firstly, China still has tens of millions of new voice users every year, and the voice income is over 70% in the entire income. As a core control mechanism for next generation network, IMS relates to

technology, organization frame, service flow and maintenance, so nobody dares to take a risk to adopt IMS system for voice service, which is vital to them. So Chinese operators have chosen the mature softswitch to provide voice service. From this point of view, IMS is only a long-term target in China, and what operators can do now is following up and testing.

- Secondly, Chinese operators have deployed a mass of softswitch systems in DC1,DC2 and local network, for example, fixed operators have nearly deployed hundreds of softswitch systems to substitute PSTN. And now is gradually shifting interconnection from TDM to direct IP. Furthermore, fixed operators have fulfilled the intelligent renovation to legacy PSTN, and are realizing the convergence with softswitch. Therefore, Chinese softswitch combined with intelligent PSTN would meet diversified service requirements in a large extent.
- Finally, Chinese softswitch has its own characteristics, which has narrowband and broadband functions concurrently. In some extent, we can say that Chinese softswitch has realized part of functions of IMS, but no mobility management and HSS (home subscribe server) function. Therefore, Chinese softswitch can provide some urgent multimedia services before IMS matured.

3) There isn't a full-service operator in China till now. From the commercial interest view, it's very difficult to establish a win-win relationship between fixed operators and mobile operators towards FMC, so the direction to FMC is diversified.

- On the one hand, fixed operators wish to move towards FMC, but before they obtain 3G license, what they can do in FMC is to package their existing resources and adopt the strategy of terminal convergence. For example, China Telecom is spreading "My e-Home" service, which bindings telephone, broadband, Wi-Fi, PHS(Personal Handy-phone System) and video services. Furthermore, Chinese fixed operators have built a large number of PHS networks, so FPC (Fixed PHS Convergence) is a problem confronted to them too.
- On the other hand, Mobile operators wish to move towards FMC too, but they can't enter enterprise ICT and home broadband market smoothly for the operational restriction, so what they can do is moving towards FMS (Fixed Mobile Substitution) at present.

4) Chinese regulatory organizations should research and adopt reasonable regulatory policies for the coming FMC, and should settle these challenges as follows:

- First of all is the challenge of maintaining a fair competition environment. Full-service operation is not only the developing trend, but also the premise of FMC. But how to prevent operators to take different policy for in-network and out-network users, and avoid malfeasant competition is a big problem.

- Second of all is the challenge of fee management. China has been executing different fee policies for fixed services and mobile services for a long period. Under the environment of FMC services, the reasonable fee policy and the charging between operators should be established correctly.
- Last is the challenge of QoS. The intention is to guarantee user's QoS on the condition that the access network and the service network belongs to different operators.

In a word, in my opinion, the basic impetus of convergence is customs' service requirements, but the ultimate limitation is the cost, not protocol standards for IMS/NGN or other one. Because the sticking point whether a good technology can be spread is the cost, i.e. will it be affordable to operators for its constructing cost and evolution risk (in a sense, risk is another type of cost). From the view of cost rationality, the new convergence architecture should be considered from the full lifecycle of cost, and pay more attention to implicit cost, such as network maintenance, upgrade and lasting development etc