

# Research on Some Issues in Development of NGN

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## I. Status Quo & Problems of Information Communication Network

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### 1. Benefits brought with Internet Success

- Significant contributions to society infomationization, and already becoming the infrastructure of information society;
- Surprising growth speed, and establishing a global network contending with telecommunication network;
- Entering the telecom industry, violently shaking monopoly position and benefiting billions of users;
- Thinking innovation, technical innovation and separation between services and network make services diversity and integration come true.

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## Problems faced by Internet Failure

- No a reasonable business model. Easiness of services development and services diversity was gained through over-consumption of resources. Non-healthy ecosystem led to economical bubbles, and delayed the development;
- Non-Regulation led to its high-speed development, while also is the fundamental cause of its security, QoS that are not be settled;
- Lack of top-level design, Internet is actually developed from bottom to top. Its operation model is 'working, while studying' and improving itself constantly.

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## Problems faced by Internet Design Concept

- Internet design concept is 'Users are the core', all around users, provide the users the biggest convenience of using network environment. Network is available, and users settle all others themselves;
- Lack of top-level design and developed from bottom to top;
- Entire separation of services network and carrying network makes service development convenient, but is unfavorable for service quality and the establishment of healthy business model.

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## Problems faced by Internet

- evolving from military network and scientific research network. In nature, Internet design concept is a non-profit. Web causing Internet explosive development is profitless, telecom operators are unable to make profit through Web services.
- Internet Development Paradox
  - Bandwidth increases faster than traffic
  - Traffic increases faster than cost
  - Cost increases faster than income

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## 2. Problems faced by Communication Network

- Internet develop rapidly, and enter telecom industry, which violently affects telecom services;
- Basic telephone market is nearly mature, and competition becomes keener and keener;
- Voice market has entered slender-profit era, data market becomes a new growth point;
- Telecom network is facing technical transition.

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## II. Development Direction of NGN

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### 1. Services Development Trend

- **Diversity** of services is not only the requirement of carriers' business operation, but also user demand caused by society infomationization;
- **Integration** of services is the inevitable result of technical development, multi-media service is the mainstream of NGN.

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### 2. All IP trend

- Real-time Services
  - IP telephone is breakthrough, which indicates packet technique of telephone services is feasible and commercially available;
  - All IP of video services comes into being;
  - All IP of real-time services has no obstacles and commercial operation has been accepted;
- Non-Real-time Services
  - Non-Real-time services are all IP
- Convergence of broadband services and narrowband services
  - Currently, only packet technique can be available

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### 3. Development trend of network depends on services

- Network is used to carry services, so development trend of network depends on services.
- Coordination of network and services will be able to take full advantage of network strength. IP network is trend

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## 4. IP based telecom network

- Next generation telecom network must be IP based. It is inevitable demand of techniques and industry development. Technologically, existing telecom network can not already meet the further demand, while IP based telecom network consisted of INTERNET+ telecom techniques will be the next development direction. In the view of the industry, next generation communication network is evolving towards IP based network, which is caused by non-matching of incumbent techniques, increase of new competition, decrease of voice traffic, increase of data and integrated services and new technologies adopted new carriers.

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## III. Business Model of NGN

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## 1. Two types of business models

- Business model of Internet, business model of telecom network; two absolutely different business models, and each has its specific purpose;
- It is very difficult for the business model based on Internet to have healthy ecosystem. However, its development can not be blocked, but only be led;
- Business model based on telecom network may have healthy ecosystem, but must match corresponding techniques.

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## 2. Transportation network and telecom network

- Transportation network —reasonable configuration of the Bada Lin highway and side road meets the demand of users and have healthy ecosystem;
- Users of telecom network not only need 'free lunch', but also take QoS of services into consideration;
- The two business models may co-exist, coordinate and develop; reasonable design may have healthy ecosystem;

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### 3. Marketing Model of Products

- Products are classified in the principle of 'quality based pricing'. Different products have different users and different prices;
- Packing sale, such as resistance and capacitance sell on weight, radish and cabbage according to a heap;
- Both the business models are existing in market,, but the former is the mainstream of business models.

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### 4. Business Model of 'Flat Rate'

- At present, flat rate widely adopted largely attributes to technique. As a lot of key problems in IP network ( e.g. QoS, impossible flat billing of different services ) has not yet been settled, it is not a good business model (such as unfairness, no individual services supported);

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### 5. Technique Orientation depends on Business Model

- Business model is supported with techniques. Different business models determine different technique orientation;
- not good business models: Over-consumption of resources and no individual allowed;
- Good business models: allow classification, 'quality based pricing' and individual services. It is the development direction;
- Existing techniques are not able to support good business models.

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### 5. 'Sunrise Industry' or 'Sunset Industry'

- 50% resources vs. 95% income (telecom)  
50% resources vs. 5% income (Internet);
- 55 million broadband users, ¥150/month  
330 million fixed telephones, ¥70/month;  
Total annual revenue:  $(0.55 \times 150 + 3.3 \times 70) \times 12 = 376.2$  billion
- As a high-tech industry, ICT industry must have huge investment. In the ICT industry, no enough profit, no keeping a healthy ecosystem
- 'Sunrise industry' or 'sunset industry' completely depends on the choice of business model and healthy ecosystem.

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## IV. Technical Issues

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## Technical Overview

- 'Quality based Pricing' will be the mainstream business model of NGN. Packing sale and bundling sale only are accessorial approaches;
- Business models determine technique orientation of future network;
- Techniques support business models. Existing techniques are not able to support business models with healthy ecosystem.

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## 1. QoS

### QoS problems caused by business models

- Business models of over-consumption of network resources (prerequisite: Network keeps light load) have not QoS problem
- Free business models of 'best effort' also have not QoS problem;
- Classified services and classified charging lead to QoS problem.

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## QoS

- QoS of carrying network (basic measures)
- QoS of services network (supplementary measures)
- Interactive control of carrying network and services network fundamentally can settle QoS problems.

**QoS problems of carrying network are very serious. So far, no good solution, need breakthrough.**

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## QoS

- IP capability is greatly improving: telephone service may be well delivered over IP network;
- In the final analysis, QoS problems of services are the problems of guaranteeing resources when opening services;
- The criteria of ensuring QoS: how to assign network resources in order to meet the resources demands of different services and further meet different QoS demands of different services.

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## QoS

- At present, MPLS is considered as the favorite technique. MPLS-based Internet traffic engineering and MPLS-base VPN are considered as the mainstream technique to settle IP QoS problems. These techniques are commercially adopted in some enterprises' networks or carriers' networks;
- Other techniques settle IP QoS problems by centrally controlling the resources of network nodes equipments;
- All these have a lot of serious problems, especially expansibility problem is very difficult to be resolved.

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## 2. Services Network & Carrying Network

- Separation of services network and carrying network is beneficial for services development, especially new services;
- Complete separation of services and carrying network is not beneficial for establishing healthy business models and personalized services. This is a blank in existing techniques.

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## Services Network & Carrying Network services network architecture(1)

- Separation of services network and carrying network is the characteristic of opening services network in packet switching network. So is IP network and ATM;
- Internet makes services network and carrying network separate completely. The two networks are absolutely not connected and cannot be controlled each other, and ISP is independent of ICP. So it is difficult to have good business models.

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## Services Network & Carrying Network services network architecture(2)

- Currently, some NGI services (such as grid, multicast based conferencing etc) are developing, but techniques are considered more than operation. The consideration is not comprehensive, and most is profitless or difficult to make a profit, lack of integrated consideration;
- Architecture is a process from top to bottom different from working style of IETF. It is very necessary for NGI to firstly determine services architecture;
- Only good matching of services and networks may form a 'Killer Application'. Web is a typical example, but its business model is not healthy.

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## Services Network & Carrying Network services network architecture(3)

- The design of services architecture specially take the characteristics of IP network into consideration: packet switching, connectionless-orientated, multi virtual circuits of users (one physical connection may support multi virtual circuits);
- Services systems of NGI will be divided into: basic services system and multiple services system, multiple services system is consisted of some basic services systems. The definition and architecture of basic services system should be paid much attention to;
- In China, NGI development has its unique opinion. However, international standards should be highly considered, and the standards will converge each other.

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## Summary

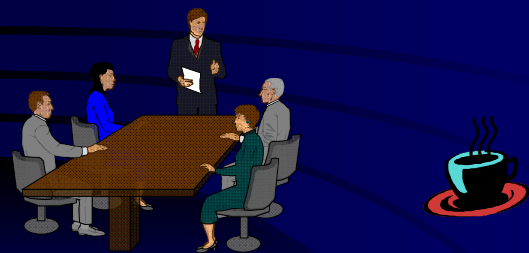
- Business models of services must gain great attention. Business models of different services adopt different techniques, and naturally their results are completely different;
- Two different kinds of business models can long co-exist, and finally will depend on economic rules;
- At present, widely adopted 'flat rate' billing largely attributes to its techniques. Very key problems of existing IP network have not yet been resolved.
- Mainstream business models of telecommunication industry is 'quality based pricing' and 'better quality, more price'. It will determine technique route of future network development.

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*Thanks !*



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