

Summary Minutes of the 7th Meeting of the Study Group on Network Architecture

1. Time & Date: 15:00 – 17:50, Tuesday, June 5, 2007

2. Place: Meeting Room on 21st floor, 3rd Building of the Kudan Common Government Office

3. Attendees

(Members) (in Japanese alphabetical order, with honorifics omitted)

Matsumoto (on behalf of Youichi Isokawa), Naoyuki Iwashita, Hiroshi Esaki, Yoshiro Okamoto, Hideo Okinaka, Yoshioka (on behalf of Mitsuo Kawato), Mikio Goto, Harushige Sugimoto, Yoshiyuki Takeda, Tetsuo Takemura, Toshitaka Tsuda, Miwako Doi, Hideyuki Tokuda (Chairperson), Akihiro Nakao, Maruno (on behalf of Takashi Hanazawa), Michitaka Hirose, Yayoi Hirose, Yoshihiro Fujita, Motoo Matsuda, Takamichi Miyoshi, Ryuichi Yamamoto, Yoneda (on behalf of Tetsuya Yuge), Makoto Yokozawa

(Total: 23)

(Ministry of Internal Affairs and Communications)

Kazufumi Taniguchi (Parliamentary Secretary for Internal Affairs and Communications), Kiyoshi Mori (Director-General of the Telecommunications Bureau), Katsuya Watanabe (Director of the Telecommunications Systems Division), Yasuo Tawara (Director of the Research and Development Office, Technology Policy Division), Naohiko Hagiwara (Assistant Director of the Telecommunications Systems Division), Manabu Nakazato (Assistant Director of the Research and Development Office, Technology Policy Division)

4. Agenda

- (1) Presentations
- (2) Free Discussions
- (3) Other

5. Summary of Discussions

[Presentations]

- Member Ezaki presented “Items and Activities of Research and Development” (Handout 7-2).
- Member Sugimoto presented “Challenges Facing the New-generation Network” (Handout 7-3).
- Free Discussion (Details to follow below)

[Free Discussion]

- Members held free discussions on the following themes regarding the New-generation Network:
 - Changes expected from the New-generation Network (social impact)

- Expectations for, and concept of, the New-generation Network
- Approaches to realizing the New-generation Network

6. Next Two Meetings

The next two meetings are scheduled for the middle of June and late June. The Secretariat will announce the details at a later date.

[Main comments and remarks made during free discussions after the presentations]

- In order to figure out what will be required from the future network, we need to comprehend the current status of the network. Should we not discuss what functions the future network should be equipped with, rather than how to optimize the network?
- Rather than recording data and using it to adjust the network, it would be good enough to make what is actually happening visible. Then, of the things that are developed, good ones will be recognized. The problem now is that we do not have such information. A gap will grow between researchers who have a testbed and those who do not.
- A testbed is a testbed and is different from a real network. It is necessary to study how to close the gap.
- It is possible to regard a commercial network as a testbed. How much data can be extracted from commercial providers is also very important from the viewpoint of competitiveness. Only Japan can make full use of data from real commercial networks, and this is our strength.
- Would it not be a good idea to go beyond the regular understanding of the status of the network, that is, to make data anonymous and available to researchers for viewing and processing? As for testbed, it often happens that you have built one, only to find it useless in reality. It would be better to first comprehend the users' needs and then to build a testbed that will meet them.
- I agree with that idea about the testbed. We should build one that the user can find easy to use freely. Furthermore, data should be easily and freely accessible.
- Client-server systems are good because one can build a clear business model. If we are to regard the New Generation as its extension toward P2P, we should note that no business investment would be made unless it is clear that real business can be built on it.
- Referring to the figure on page 3 of Handout 7-2, in the 2nd P2P, the manufacturers and the system vendor made profits; in the 4th P2P, the service provider made profits; and in the 5th P2P, the PC manufacturer made profits. In services, the person who is responsible for the assets (equipment and facilities) invests. What was good with the Internet was that you did not have to own the assets. If we suppose that the 4th P2P is the infrastructure, everybody would be able to do what Google intends to do. Thus, things will be distributed. Although business models become more complicated, I can imagine some people will start doing business by taking advantage of it.
- Since the Internet tends to have a pattern of occasional bursts in access, it is questionable

whether it is possible to have a set of permanent nodes installed. On the other hand, it is hard to predict the direction in which things will evolve. We therefore need to make the level at the physical layer flexible also.

- As pointed out, things will not be determined in a fixed manner. I guess many networks in Japan today have at least a double-ring structure. It may become necessary to introduce a full-mesh configuration.
- If you allow me to say something drastic, when we talk about the network architecture, we should be able to include the redesign of the protocol in the scope of study. Then it may become easier to realize power saving, etc.
- In the U.S., ideas are emerging that are not IP-centric. I feel that it is necessary to think about the impact such may have on the common network, but I have no concrete images.
- If we are to include the protocol, we might be able to see as far as power consumption. However, it might be necessary to view the network from a wider perspective and to figure out how we should design the system, including processing, to become an eco-system.
- Although not limited to the network, I hear that the State of California is pondering on how to deal with all its energy. As for the network, I think it of prime importance to ponder on how to manage it as a whole.
- It may not be a problem to optimize things after a change has taken place. On the other hand, it may not work if you try to optimize things while a change is taking place. For now, on balance, it is necessary to figure out how much optimization we should achieve.

[Main comments and remarks made on Theme 1 of Free Discussions]

- What the users may expect from the network may be diverse. Of various things offered by the network, only those that are economical will be actually used. Our discussion on the allocation of network functions should be based on this viewpoint.
- It is also necessary to first think about how low we should keep the total power consumption of the network from the viewpoint of the global environment, and then to bring it backwards to the design of the network.
- Telecommunication generally consumes less energy than physical movements of humans, but it will consume more energy if we make it do too much extra work. Conventional wisdom tells us that the more telecommunication advances, the more activities humans do, causing things to become less ecology-friendly. However, network engineers have no choice but to increase network efficiency. The challenge for society is how to harness it to ecology.
- From the viewpoint of network operation, how to cope with increases in power consumption has been on our agenda. If we allow it to continue to increase, the result would be a disaster.
- In an attempt to solve international social problems that Japanese are not aware of, we might as well have a discussion from the viewpoint of what the network can do.
- So far our discussions have primarily centered on the builder's point of view. We would like to accommodate the viewpoint of the people who live in society.

- The trend seems to be that the user can now start a service on his/her own initiative. In order to vitalize this trend further, it is important to make things visible, and in this regard, the technology of ubiquitous society, which enhances visibility on the user's side, is gaining importance.
- It is necessary to provide not only open things, but also closed things such as security. The point is who shall be responsible for authentication, etc.
- Security on the network and the real society should go hand-in-hand, sharing the same pace of progress in level. However, whether the high-level security achievable on the network is acceptable to society is a complex question, particularly in consideration of costs. We need to take the relationship with the real society into consideration.
- It would be desirable for a certain level of security to be provided by the network according to the users' requirements and for the infrastructure to be equipped with a function that will decide the flow of data in accordance with the type of content and the type of application.
- As to the social infrastructure, we need to consider not only the needs we see, but also the design beyond them. Technological and social innovations can be achieved by marrying the virtual community and the real community.

[Main comments and remarks made on Theme 2 of Free Discussions]

- I wonder if the concept of circulation of "knowledge and wisdom" might suit the New-generation Network so well that the system will lead people to the optimum action according to context as well as content.
- We can think of different levels of dependability; for example, this price if 99%, and this other price if 99.999999%.
- I feel that we have not yet decided where to draw the line between the network and the application. We also need to address this.
- It has now become possible for anybody to contribute new knowledge and wisdom to society and to create his/her knowledge and wisdom with the help of society. The new architecture should be also able to accommodate such a framework.
- Networks today are linguistically bound in many ways, such as the use of URLs and passwords. We will also need to figure out how to accommodate analog information such as senses and images into the network.
- In the world of building architecture, people talk about who designed the building. Why not replicate that situation in the network world; for example, the presence of a revered architect behind the network wins people's trust?
- What should a society that needs the network as a prerequisite for its very existence look like? What kind of infrastructure and services should be provided?

[Main comments and remarks made on Theme 3 of Free Discussions]

- Social innovations take place at a slower pace than technological innovations. I regard the

New-generation Network as capable of driving a social innovation.

- Apart from large capacity and high speed, we need to take such a viewpoint that the network will accommodate these user-driven approaches.
- In order to conduct research covering such expanded areas close to the domain of services as to provide benefits to users (players), we may need to invite people from other fields. To that end, we would need an environment (testbed environment) in which users and application developers participate with great liberty in the development.
- From the viewpoint of offering technology to the world, it is important to win international users by demonstrating that ours is something that everybody is already using and finding really useful.
- In environments where wireless is the only means of connection, wireless will become the bottleneck. It is therefore necessary to incorporate wireless into the architecture.
- In R&D in the field of wireless communications, since we cannot obtain many licenses from the authority, we tend to end up with something peculiar, because we need to do experiments with limited specifications. While pursuing a good balance as to the total architecture, we need also to accept situations where we have to settle for something peculiar.
- Would it not also be necessary to secure geographical expanses for testbeds? For example, with a system involving mobile devices such as ITS, it may be necessary to make an entire town a testbed.
- There are many approaches to R&D. Successful R&D projects are those that are operated well.
- Each Japanese person is viewed by the Government policy as a user. It would be a good idea to form an organizing body that includes expert users who will lead those lay users.
- Talking about Japanese citizens as general users, I do not feel that it is necessary to involve every single citizen in the discussion, but at the same time, instead of cutting them off (just because they cannot understand), it is necessary to consider them and to provide a framework for such consideration.
- In order to make the system user-driven while guaranteeing security, it would be necessary to grant rights to the users, which would then result in the users taking control of security. Solutions to this problem cannot be found from the technical viewpoint alone.
- As for NWGN also, we need to think up something appealing. I am referring to the semantics for the Tokyo Olympic Games and the Shinkansen project. At some point in time, we will need to show the Japanese public what is new and how it is different.