

Summary Minutes of 9th Meeting of Study Group on Network Architecture

1. Time and date: 10:00 to 11:50, Friday, June 29, 2007
2. Place: Meeting Room on the 21st floor, 3rd Building of the Kudan Common Government Office
3. Attendees

(Members) (in Japanese alphabetical order; honorifics omitted)

Tomonori Aoyama, Matsumoto (on behalf of Youichi Isogawa), Naoyuki Iwashita, Gota Iwanami, Yoshiro Okamoto, Misawa (on behalf of Hideo Okinaka), Yoshioka (on behalf of Mitsuo Kawato), Hideshige Komatsu, Shinji Shimojo, Harushige Sugimoto, Yoshiyuki Takeda, Tetsuo Takemura, Toshitaka Tsuda, Miwako Doi, Hideyuki Tokuda (Chairperson), Akihiro Nakao, Hagimoto (on behalf of Takashi Hanazawa), Yayoi Hirose, Yoshihiro Fujita, Nishino (on behalf of Hiroshi Fujiwara), Motoo Matsuda, Takamichi Miyoshi, Yoneda (on behalf of Tetsuya Yuge), and Makoto Yokozawa (Total: 24)

(Ministry of Internal Affairs and Communications)

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

4. Agenda

- (1) Presentations
- (2) Approaches for the Realization of the New-generation Network Architecture
- (3) Other

5. Summary of discussions

[Presentations]

- Member Okamoto gave a presentation on “Use of Communications and Networks in Automobiles and the Challenges thereof” (Handout 9-2).
- Member Yokozawa gave a presentation on “Social and Economic Impact of the New Network Architecture” (Handout 9-3).
- Discussion (Details below)

[Approaches for the Realization of the New-generation Network Architecture]

- The Secretariat gave a presentation on “Approaches for the Realization of the New-generation Network Architecture (Proposal)” (Handout 9-4).

- Discussion (Details below)

6. Next meeting

The next meeting, which will be the final one, is scheduled for 13:00, Tuesday, July 31. The Secretariat will announce the details at a later date.

[Main comments made about the presentations]

- One of the applications of ICT to automobiles we can think of is a system whereby a portable card, similar to the SIM cards used in mobile phones, is used to transfer information about metering, insurance and services subscribed to, between cars, regardless of the make and model of the cars, thereby allowing anyone to use any car as if it were their own. The fact that there is a used car market creates a new issue, which is that is, two identification numbers will be needed for each car: an identification number of the SIM card that contains the service-related information and a unique ID number for each car. Would such an ID system be robust?
- Keyless entry systems, for example, use an encryption system based on a cipher key a certain number of bits long. There have been several reports, however, of cases in which the cipher key was easily discovered by a person using a computer, which are rapidly becoming more powerful these days. Therefore, lengthening the cipher key may not be the best way of ensuring security. In practice, however, considering the limitations of on-board systems for carrying out calculations, for the time being we think the best thing to do is to use a combination of several shorter cipher keys.
- On page 8 of Mr. Yokozawa's presentation material there is a discussion about the question, "If the network architecture is to be replaced, what would be the main driver of this?" There is a clear answer to this question in the field of telecommunications, that is, paradigm shifts have come about because of the terminals and the nature of the information accessed through them. So far the drivers of these paradigm shifts have been telecommunication devices: the telephone and the personal computer. Now, what will trigger the next paradigm shift? Well, frankly, there are no candidates in sight. So far, it has been clear what kind of architecture is the best. However, because in the future everything will be connected to the network, we cannot tell what the best kind of architecture will be. At any rate, I believe the idea of making "everything connected" will be the driver for the next paradigm shift.
- The main point of differentiation from the conventional network is the concept represented by the word "ubiquitous", that is, everything is connected to the network. We cannot, however, say exactly what effect it is going to have on both daily life and business. That's why we have brought this up as a subject for discussion
- In his presentation, Mr. Yokozawa points out that the layer structure is changing. Taking a look at the social layer structure, we can call the Meiji Reformation a kind of paradigm shift in that the social layer structure of *shi nou kou shou* (samurai, farmers, craftspeople,

merchants) crumbled as the Edo Era gave way to the Meiji Era. The fact that the network's layer structure is crumbling can be interpreted as a sign of the time for change. Referring to the question of what the layer structure should look like for the next generation, we still cannot tell whether there will be a new platform or something similar. I agree, however, that we should try to come up with something entirely new that is not based on the conventional layer structure.

- The presentation mentioned the importance of telecommunications infrastructure, which I think depends somewhat on, and varies with, the region or country. What stance should we take in regard to regional differences? In other words, should we deal with them by means of something like a platform or individually by region or country?
- From the viewpoint of global deployment, it would be ideal to have an international standard. In reality, each region or country has its own bandwidth allocation that is a reflection of its own development. Also, security requirements vary from country to country. For example, between Japan and the United States, town planning is quite different, and so is the thinking about isolation of radio waves. It would be ideal to have one standard for one frequency band, but in reality this is difficult because of local conditions. Our idea is to accommodate such differences using new technologies like wireless software.
- It is very intriguing to hear that we have come to a stage where we can no longer envision next-generation architecture that does not have the upper service layer and the social layer. Also interesting is the concept of a "visible network with memory." While the concept of "visibility" is important in itself, we have thus far been focusing on how to remove states, since a network would become immobile once it acquires memory. For example, all services that have states such as multicasting have failed. What do you think?
- Our idea is to take a technical approach to equipping the network with memory. The current practice is that the providers keep a log of their intentions. It may be possible to force it by regulatory means, but this is not a technical solution.
- Page 21 of Mr. Okamoto's handout depicts a wireless overlay network that goes from a car to a nearby intersection and on to "macro." Similarly, we can think of public means of communication, such as wireless fidelity, or WiFi, WiMAX and mobile phones. I think it strange to treat them as two entirely independent worlds. I think there should be some intersection. How much research has been done on this issue? Or, should they be totally isolated from each other?
- Frankly, this is something we will need to look into. Thus far, because of several different factors, most ITS communication systems have employed an insular security mechanism based on their own architecture. The ideal would be for the next generation to employ a new, more universal architecture that will allow for better performance and tighter security. That's the direction we would like to take in our research.
- When it comes to the sophistication of the automobile, one of the alternatives would be not to have a human driver at all. Apart from the current model of assisting human drivers, can't

we envision other automobiles that can be realized by advances in IT? If we are to solve the problems through technology, we would need to build a new infrastructure to do it correctly. The new infrastructure would not be compatible with the existing ones, making it expensive. Therefore, it would be better to aim for something new.

- Some people say we need to make a wholesale review of the social structure from the ground up. On the other hand, owning a car is a pleasure in itself for many people. It is important to think of how to balance social considerations with individual freedoms. We are currently pursuing reliability, focusing on automobile safety.
- Years ago, it used to be easy to track Internet accesses because there were relatively few computers connected to the Internet. Recently it is becoming increasingly difficult because there are a lot of users connected. It is in the nature of human beings to carry out illicit acts if given anonymity. While the ways the Internet is used is increasing in variety as well as quantity, a question remains as to whether it is a good idea to impose authentication as a rule in order to do away with anonymity. Some users may be uncomfortable about their access being recorded in the process of authentication. I think it is very important to make the Internet more open while securing reliability.
- While it is possible to carry out research on architecture from a technical perspective, the biggest issue in the real world is what role money plays during the process of building a system, I believe.
- In a forum held jointly by the NSF and the OECD in January 2007, there was an argument that one should also study the impact that social and economic factors have on network architecture. In studying a new form of network architecture, I think it is important to discuss whether or not to incorporate a metering mechanism into the network's design, just as the metering signal is incorporated in circuit switching.

[Main comments made about "Approaches to Realizing the New-generation Network Architecture]

- The important thing is to come up with a network technology that can be easily integrated into daily life and society at large. It is important to have a setup in which services are delivered through terminals and networks, which are in turn connected via the network architecture. On page 5 of the handout on the approaches the term "service" is mentioned several times. However, I'm afraid it is used in a limited way, that is, the porting of a service, which limits the scope narrowly to include only the terminal. It might be better to paint a picture of network services and terminals interacting collaboratively. Further, referring to the five examples of approaches given on page 13, it might be better to include a wider perspective that covers everything. Each technological component is indeed extremely important, but since our focus is on architecture, we need to include a sort of summary chapter.
- I also appreciate the effort of the Secretariat to propose approaches to developing

technological components, but as Mr. Shimojo has put it, I think we should have something, like a principle, that holds them together. If this something is to fit in with the title, which says “The new-generation network for people living in society,” then there won’t be any gap between the title and the main body of our report.

- When we think of the impact on people’s lives, it would be nice to present a realistic picture, such as, “The network can solve such and such a problem in this manner.” For example, page 12 says “Construction of a strategic R&D organization [also incorporating the viewpoints of other fields],” but when people from different fields get together for a discussion, they tend to stick to their own fields, and as a result, the viewpoint of the network gets lost or the arguments don’t converge. If we pick a current social issue of general concern and discuss in concrete terms how we can address it using the network, then we will be able to deliver a most convincing message to the general public. Further, if we pick a new, complex issue in which a social problem and a problem associated with the Internet are intertwined and if we present a network-based solution or at least show that we are working on a solution, then it will become easier for the general public to get a general idea.
- I think that trust or reliability will be fairly high-level concepts. The biggest problem with the Internet today (the Internet Version 1) is the lack of reliability, which is somehow related to social issues.
- The handout on the concept lists the concern about safety and reliability as one of the issues and says that it must be resolved. While we have been discussing security and safety in this study group, when it comes to technological components safety looks a little difficult to achieve. There are two kinds of reliability: one is about the guarantee of a bandwidth or nonstop operation, and the other has to do with local problems at a higher level, for example, whether tracing works even in the presence of a certain problem or whether a certain problem can be prevented from occurring. I’m afraid that the latter is not addressed by technological components of the approaches proposed and hence that the higher-level goal of achieving security and safety is not properly addressed. Since this has been discussed in this study group, I would prefer that these new technological components be linked to security and safety.
- Just in the same way as the Internet was created when there was no Internet, the new-generation network is going to be the second Internet that will be created. American blue-chip companies such as Google and Cisco have emerged from the Internet. It is important that in Japan, too, we create a system that will support the growth of venture companies into major players.
- Page 11 of the proposed approaches says, under item #2, “Reflection in the standardization of next-generation networks (NGNs) ITU-T is working on.” I believe this standardization issue pertains only to NGNs, which is different from the next-generation network architecture we are dealing with, and hence this sentence should be amended, I’m afraid.

The next-generation network architecture we are dealing with would require an entirely new forum for standardization. I would prefer to have a statement here to the effect that Japan should take the initiative in such a forum.

- In thinking of the second Internet, we need a system where people with a variety of backgrounds come up with a variety of ideas for creating better network services and better network architecture, with the best ideas then being adopted. In this regard I very much appreciate the fact that page 9 of the proposed approaches mentions, under item #2, "Study of a new R&D program," referring to a program which will enable creative research into new ideas and approaches. Such a program would be very attractive in that it would enable us to compete with the United States and Europe.
- I find the technological components mentioned on page 7 of the proposed approaches very important. I personally tend to regard the Internet as a configuration of a large number of LANs that has grown and grown, but now I see the future as a time when a variety of knowledge combined creates a variety of value. What is expected of us in this context is that we support the combining of useful knowledge while providing reliability, so that this combination will not end up as a source of improper tools.