Summary Minutes of the 8th Meeting of the Study Group on Network Architecture

1. Time & Date: 10:00 – 11:40, Tuesday, June 19, 2007

2. Place: Grand Meeting Room, 2nd Building of the Ministry of Internal Affairs and Communications (Statistics Bureau)

3. Attendees

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

Tomonori Aoyama, Matsumoto (on behalf of Youichi Isokawa), Naoyuki Iwashita, Gota Iwanami, Yoshiro Okamoto, Misawa (on behalf of Hideo Okinaka), Yoshioka (on behalf of Mitsuo Kawato), Mikio Goto, Shinji Shimojo, Harushige Sugimoto, Yoshiyuki Takeda, Tetsuo Takemura, Nojima (on behalf of Toshitaka Tsuda), Katsube (on behalf of Miwako Doi), Hideyuki Tokuda (Chairperson), Akihiro Nakao, Maruno (on behalf of Takashi Hanazawa), Nishino (on behalf of Hiroshi Fujiwara), Motoo Matsuda, Tetsuya Yuge

(Total: 20)

(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 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) Concept of New-generation Network Architecture

(2) Other

5. Summary of Discussions

[Introducing the AKARI Project]

○ Member Aoyama presented ”Research on New-generation Network Architecture (II) – Introducing the AKARI Project” (Handout 8-2).

[Concept of the New-generation Network Architecture]

○ The Secretariat presented ”Concept of the New-generation Network” (Handout 8-3).

○ Free Discussion (Details to follow below)

6. Next Meeting

The next meeting is scheduled for Friday, June 29. The Secretariat will announce the details at a later date.

[Main comments and remarks made on “Introducing the AKARI Project”]

- ○ You are promoting the AKARI Project for this fiscal year and the next. Are you intending to continue to have discussions with young researchers?
- ○ This time we have reported what we studied in the last fiscal year as the first version. From now on, we would like to flesh it out through discussions with people from universities and industry.

[Main comments and remarks made on ”Concept of the New-generation Network Architecture”]

- ○ The report of this Study Group treats the network as something as wide as covering applications, whereas the AKARI Project treats the network as something simple and stupid and provides more in-depth discussions. Since there are discrepancies, we are confused. It might make things easier to understand if you draw a clear line between the network and the applications in terms of which the various functions will be allocated to.
- ○ Two of the reasons for the success of the Internet is its transparency and openness, which has enabled various people to participate in and conduct experiments using the Internet as a testbed. If management through the network means that it will be closed and freedom will be taken away, then there will be no progress for such a network. From this point of view, we would like to keep the transparency and openness of the network. On the other hand, if we were to push too hard for them, it would be like keeping the house unlocked, which raises a security issue. Striking a balance between the two is important. So much is expected of the network: open, dependable, safe and secure. It is therefore extremely important to work out a well-balanced solution that is not dichotomy (one way or the other). David Clark advocates what he calls “controlled transparency,” arguing that it is necessary to work out a scheme that guarantees transparency for certain parts while controlling other parts, rather than making everything transparent. However, not even Americans have found the solution as to who to control what. This is a serious problem for the AKARI Project also, and is one of the key points of our network architecture. Networks continue to become sophisticated, demanding a variety of functions. There must be, however, some commonality among these functions. We need to build such common parts in a manner that ensures simplicity and transparency. By extracting commonality, we would like to realize a system that meets a variety of user needs.
- ○ As to the separation of the network from applications, it appears as if no solution exists to somebody who has long been accustomed to legacy-type security. In a way, we have maintained the legacy-type security just because we could not find any other solution. Some argue that we should abandon legacy systems, which are stale and with no future, to make things open. Well, open systems have their own problems, such as unintended leaks of

information as evidenced by the Winny incident, and it is therefore hard to convert to open systems altogether. Such problems would not occur with our closed legacy-type networks. With open networks, however, it would not be possible to solve such problems only by improving the way you describe the network. For example, mightn't it be necessary to provide an upper layer with a mechanism whereby the end user can check whether a particular piece of information on the network can be trusted or not? Unless services and the system are properly designed as a concept higher than application, we would not be able to solve security problems. While it may be difficult for this Study Group to come up with an answer addressing this ultimate point, is it not necessary to consider building such a mechanism?

- As to safety and security, we have the police in the real world. However, the police may not be totally dependable, and we need to make arrangements with a security company when necessary. The police cover the level that is considered necessary by common sense, but beyond that, the user needs to hire security services individually according to his/her needs at his/her own expense. Likewise, common sense will eventually determine the minimum level in the virtual world. What we need to do would be to gain consensus. As to what level the consensus should be, I would say social rather than technical.

  In addition, as we try to bring our discussions together at this Study Group, we are finding a number of differences, though not totally exclusive to each other, such as the dilemma between how to make the network simple and where to allocate individual functions. Each issue is important in its own right. We need to discuss how to build architecture and technologies accommodating such conflicting issues with a good balance and how to reach consensus or a common ground regarding these issues. Only after having such discussions will we be able to find ways to put them together and to get a sense of the direction the new network architecture is taking.
- Although the Internet today is an open network, it used to be a very closed one. Only those universities and research institutes of private companies that subcontracted research work from DARPA were connected to DARPA-NET, which was the precursor to the Internet. This created a situation that can be regarded as the world's first digital divide, in that graduates of the universities connected to DARPA-NET sought employment only with universities or companies that were connected to DARPA-NET. In order to solve this digital divide, Beck Poewr, Davidand Weber, and some others built a network called CS Net, which interconnected most universities (including community colleges) across the U.S.A. and on which FTP and E-mail services were available. Nobody on this network sent spam mail or tried to do phishing, and the network technology advanced around this network. In the mid-90s, Internet service providers came into being, which drove commercial use of the Internet and made the Internet open almost overnight. Along with it came all the nuisances such as spam mail and phishing. Since the controlled transparency as proposed by David Clark is going a little overboard, I feel that it is necessary to realize a controlled transparency

that is a little tailored to the user in order to make the network support our life in ordinary society.

- ○ I find a gap or discrepancy between the two presentations made today. While Handout 8-3 focuses on services, the story looks inconsistent or incomplete since it fails to cover the service overlay issue, which should be addressed when trying to map services onto the network. As to the services mentioned on page 16, would the very structure for services be any different for a community network?
- ○ In answer to the criticism that applications are not covered in detail, I would like to mention that, with NICT, we are studying the connection between applications and the network by building a testbed that looks similar to an overlay network. In studying the New-generation Network, we need to establish a good balance between the top-down approach, namely, the viewpoint of how to meet the requirements from applications; and the bottom-up approach, namely, the viewpoint of what we can do using the network technology (seeds). In this regard, I think it necessary to study the issues further and to refine the ideas.
- ○ Perhaps we should regard the New-generation Network not as something that can be created overnight, but as something toward which we need to migrate existing networks while ensuring a smooth transition. I believe things will go well if we can successfully virtualize the network by using overlays.
- ○ Various approaches can be conceived. The U.S. is taking an approach whereby they build a testbed such as GENI, call for 26 proposals for projects through FIND, and have many people run them simultaneously. Five or ten years later, they will skim the essential parts from chaos. While it is a good idea to start with design by thinking out the principle, it is also important to take an empirical approach, trying out various ideas using a testbed, etc.
- ○ The Americans have a total project configuration for research projects such as FIND. The AKARI Project conducts research on architecture. Some projects are funded by the Ministry of Internal Affairs and Communications or NICT, while others are led by NICT on its own initiative. So far, aid has been provided individually without much coordination among different projects, e.g., “this and this for the testbed; this and this for the application; this and this for wireless.” However, I think it necessary for us to take a concerted approach on how to structure and promote projects. Taking the testbed as an example, we should put our heads together to come up with ideas and do the operation ourselves, instead of leaving everything to the carrier. We would expect the Ministry of Internal Affairs and Communications to take a bird’s-eye view and to think out a framework in which various projects are run under one umbrella and budgets are allocated in various ways so that various organizations such as companies and universities can participate.
- ○ While I understand that the main focus of this Study Group is on technology, we would like hereafter to cover various issues beyond technology, such as business models, services, and authentication.
- ○ Before business was brought into the Internet, security and business model issues were taken

care of individually by the architecture appropriate for them. From now on, what architectural framework will be needed to meet the varying demands? It is important to demonstrate to people who want to start their own business that, through experimental use, a testbed will become a device for incubation. In addition, in order to realize such a testbed, it is necessary to take the aspects of social and legal systems as well as technical aspects into consideration. The U.S. has long been going in such a direction as to involve not only academia but also industry in the utilization of testbeds, considering future commercial applications. We need to learn from best practices abroad.

- With regard to energy saving in the operation of networks, it is of course important to reduce power consumption in telecommunication itself, but it should also be pointed out that higher image resolutions mean higher energy consumption. It is therefore better to include a viewpoint of total energy saving demonstrating that, on balance, the total energy consumption by society will decrease because of the increased use of telecommunications technology and services, which inherently reduces the amount of waste.