Summary Minutes of the 4th Meeting of the Study Group on Network Architecture

1. Time & Date: 10:00 – 12:00, Tuesday, April 10, 2007

2. Place: Special Meeting Room #4, 4th Floor, Mita Kyoyo Kaigisho (Japanese Government Conference Building)

3. Attendees
(Members) (in Japanese alphabetical order, with honorifics omitted)

Takashi Matsumoto (on behalf of Youichi Isokawa), Naoyuki Iwashita, Gota Iwanami, Yoshiro Okamoto, Hideo Okinaka, Toshifuku Yoshioka (on behalf of Mitsuo Kawato), Mikio Goto, Shinji Shimojo, Harushige Sugimoto, Tetsuo Takemura, Toshitaka Tsuda, Miwako Doi, Hideyuki Tokuda (Chairperson), Takashi Hanazawa, Yoshihiro Fujita, Motoo Matsuda, Takamichi Miyoshi, Tetsuya Yuge, Makoto Yokozawa

(Total: 19)

(Ministry of Internal Affairs and Communications)

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) Envisioning New-generation Network
(3) Other

5. Summary of Discussions
[Presentations]

○ Member Okinaka presented ”A Thought on Challenges and Direction of the New-generation Network” (Handout 4-2).
○ Member Miyoshi presented ”Study Group Memo on Network Architecture“ (Handout 4-3).
○ Free Discussion (Details to follow below)

[Envisioning of New-generation Network]

○ The Secretariat presented “Study Memo for Study Group on Network Architecture: Keywords Taken from Presentations Given in the First 3 Meetings,” which summarizes the presentations given in the previous three meetings.
○ Questions and Comments (Details to follow below)

6. Next Meeting
The next meeting is scheduled for April 20. The Secretariat will announce the details at a later date.

[Main comments and remarks made during free discussion]

○ There are two concerns in introducing overlay platforms. First, to realize an overlay structure, it is necessary to provide many different platforms. The question arises here of whether there are scalable solutions that take advantage of it. Second, the infrastructure business is not profitable. As a result, we should also study who should take up the platform as an industry.

○ As to the expansion of the communication platform as shown on page 10 of Mr. Miyoshi's presentation handout, how big is the area of coverage as an industry? I feel that each individual piece is gradually shrinking and that developing them piece by piece would be too costly. I wonder if it is possible at all to create a platform that serves as the greatest common denominator.

○ Personally, I would like to see a greater variety in means of communication. Just as many appliance manufacturers emerged when electricity emerged as infrastructure, I would like to expect the development of a model whereby various industries emerge and grow around this new infrastructure. Today, as far as the network is concerned, the infrastructure and the application industries that utilize it are inseparable from each other, but the application industries are expected to grow in the future.

○ While I agree with the view that it is difficult to implement upper-layer services on the infrastructure, I would like to point out that, in today's networks, upper-layer services are constructed on the IP network infrastructure. We need to examine whether it is important to further separate upper-layer services from the infrastructure of the new architecture or to pursue other types of implementation.

○ It seems that services have been separated from the network thus far, but demands are increasing for them to be integrated into the network with respect to quality, security and safety. Whether it is truly desirable or not is hard to determine. We should, however, sit down and rationalize whether email security and the quality of emergency communication should be handled by the network as part of the features of its architecture. Talking about QoS and priority, for example, there are just a few levels provided today with regard to quality of emergence communication, such as "urgent" or "not urgent." It might be technically possible to refine the distinction to as many as about 10 levels, but then whether or not we would be able to use them in practice is questionable. We will need to think about all these issues.

○ In the world of Wintel (PC platform controlled by Windows and Intel), the Intel CPU and chipset constitute the infrastructure, whereas Windows constitutes the platform, and the various applications running on it correspond to services. It may be possible to clearly specify what Windows functions should be included in the platform, but the world of communication is different from that of PCs. It would therefore be part of our agenda to discuss where to draw the line between the infrastructure and the platform for the network, and whether it is possible at all to separate them.

○ With the IP network, intelligence has been open to the user. As a result, a variety of applications has been created. A large number of users are now using the network, and the knowledge level of users using end systems has become diverse. With this background in mind, we need to determine what end systems should accomplish and what the network should accomplish. Once this is finished, we will need to discuss what should be done, in what layer of the network.

○ I consider the end system equivalent to the network system, regardless of the architecture. We construct equivalent systems on IP, and make them a platform. The argument as to which functions should be allocated to the network and which functions should be allocated to terminals can be intrinsically separated from the issue of how to construct the platform. Would it not be better to be able to discuss how to position functions within the platform, rather than to rigidly define them as part of the architecture?

○ As I see it, since the function of arbitration can be implemented anywhere in a transparent form, the issue of conflict between different platforms can be deferred to a later date. On the other hand, I am concerned about the possibility that conflicts between platforms over limited resources might complicate the arbitration scheme.

○ I think this is already happening. In the case of commuting rushes and seat reservations,

society can tolerate the lack or insufficiency of resources once a consensus is reached regarding the required balance. While some argue that the infrastructure must always be sufficient, it is difficult to satisfy everything and everybody.

- ○ Legacy networks are what underpin the important infrastructure. In conceiving a next-generation network architecture, it is important to also consider how to move people using legacy networks to the new network.
- ○ I do not consider it a big problem that legacy networks will survive as they are. I do not feel that it is necessary to replace all the necessary networks. It is, however, important to think about how to treat legacy proponents, since quite a few young people today do not even know what legacy systems are like.
- ○ Considering that the network, by its nature, can be controlled to a certain extent, I wonder if it is a good idea to only pursue simplicity. Would it not be better to equip the network with the capability to control QoS and bandwidth in cooperation with services?
- ○ One of the differences between the network and other infrastructures such as the water supply system is that you can be one of the sources, as is the case with medical records in hospitals. It is thus necessary to study how to share resources and where to store them—not only network resources but also data as a resource.
- ○ Future terminals will be more like mobile communication terminals than like PCs. With FMC terminals, the network side would also need to have some intelligence. If we are to reconsider establishing a network that behaves like an infrastructure in such situations, then that can be an intelligent network equipped with somewhat advanced functions.
- ○ These arguments seem to lead us to believe that optimum control can be realized by having the real network and the overlay exchange information. However, I have always thought an overlay should be designed to have as little contact with the real network as possible. What do you think of my view?
- ○ When designing an overlay, you might wish to have complete liberty by completely separating it from the real network space. However, it may not be entirely possible to think of only the overlay without using security measures provided on the real network, because actual traffic goes through the real network even if it appears to take place in the overlay.

[Main comments and remarks on “New-generation Network”]

- ○ The presentation discussed what functions to incorporate into the network and how to allocate them. Would it not be better to be more specific?
- ○ The presentation seems to be addressing technical issues very well. On the other hand, now that the Internet has gained the status of a *de facto* infrastructure, it is also important to think about who should bear the cost. The discussion of where to allocate the functions depends significantly on the outcome of such consideration. It would be better to reflect this in the presentation.
- ○ Talking about the relationship between the architecture and society/economy, the Internet today has been defining society/economy in a way. When the Internet was designed, little consideration was given to society/economy. Today, the U.S. is taking a new approach, that is, they are trying to draw requirements for the architecture out of the society/economy, which includes the issue of governance. Event with today’s Internet, much energy is spent on the management of domain names, etc. We should incorporate social/economic viewpoints into our new architecture to avoid such arguments.
- ○ I regard addressing based on abstract concepts as a very important theme, which is also related to the issue of governance.
- ○ It is extremely important to define functions and then to determine where to allocate them. It is worth pointing out that more and more new functions will be demanded from now on, and to

deal with this, it is important to consider how the interface should be defined for the network as a whole, so that new functions can be smoothly introduced.

- The operating system used to be based on a monolithic kernel, so that once it went into operation, it was hard to add anything. Now we have a dynamically loadable kernel, which allows us to add new entities without taking the system down. It would be nice to develop a network to which we can add new entities without stopping its operation in a similar manner.
- Should we not clarify what the essence of the architecture shall be?
- We should ask ourselves these questions: what the design principles for today's network are, what the design principles for NGN are, whether we will need to modify the design principles, whether we can continue to use today's design principles as they are in thinking out the new architecture, or whether we need to modify even the design principles.
- It would be nice to be able to specify terminals using abstract concepts such as semantic routing when there are a variety of terminals, or when the service provider provides services.