MSF Global Interoperability Testing for Next Generation Networks

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Abstract

The Multiservice Forum (MSF) promotes technical standards for Next Generation Networks (NGNs), aiming to ensure a truly interoperable multi-vendor environment that can be easily expanded in an economical manner. This article introduces major trends in MSF including its core mission: the GMI (Global MSF Interoperability) test event.

1. About MSF

The Multiservice Forum (MSF) was established in November 1998 by a group of service providers and system suppliers, primarily from North America and Europe. As of July 2005, there are 41 participating companies including NTT. Major participants include BT, Verizon, Korea Telecom, Vodafone, Cisco Systems, Hitachi, Fujitsu, NEC, and Mitsubishi Electric. The forum's major activities are:

1) Forming architectural models for interoperation of network devices
2) Developing Implementation Agreements (IAs) for inter-device protocols
3) Hosting interoperability testing events.

MSF activities go beyond theoretical discussions of architectural protocol specifications to comprehensively include protocol profiling and post-implementation global interoperability testing [1].

2. NGN standardization and MSF

Next Generation Networks (NGNs) are based on IMS (IP multimedia subsystem), the functional architectural model for signal-based call processing defined by 3GPP (3rd Generation Partnership Project). The requirements and architecture for NGNs are being discussed in standards organizations around the world, and the specifications are beginning to take a stable shape.

However, the fact that NGNs will be composed of components from multiple vendors will naturally lead to different interpretations of standards and variations in the combinations of component selection. Therefore, to guarantee that the whole network will work properly it is not enough to simply say that specific functional components comply with the standard.

MSF, in contrast with the other standards bodies, goes beyond theoretical standardization by conducting profiling for each functional component in actual network devices in line with the functional architecture defined by the various standards bodies. By defining implementation requirements for the protocols between devices and confirming the interoperability between devices of different vendors, MSF is able to prove that standardized architectures will serve as actual network solutions.

In current NGN standardization discussions, the various standards bodies are producing slightly different functional architectural models. MSF has undertaken the role of converting these divergent standards into actualized services. This is a very important role and the carriers and vendors around the world are paying a lot of attention to these activities and have high expectations for them.

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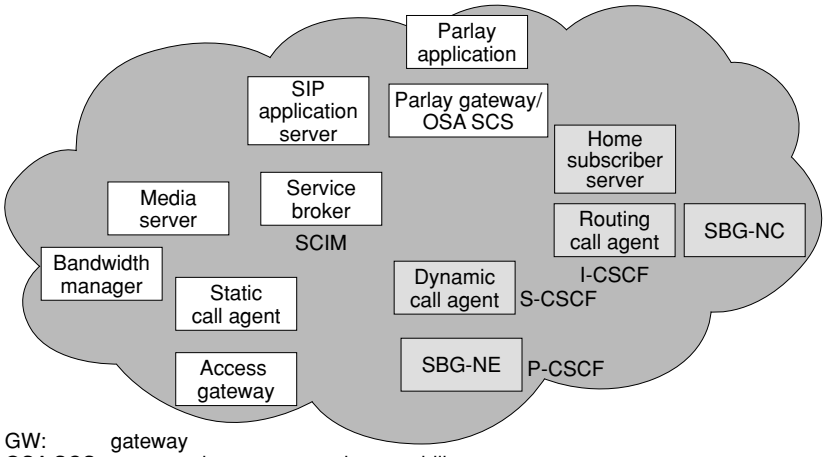

Fig. 1. MSF R3 architecture.

3. Past MSF activities

In MSF's Release 1 (R1), the architecture was functionally separated into the control plane (C-Plane) and user plane (U-Plane): for example, the media gateway (MG) was separated from its control functionality [2]. The feasibility of this R1 architecture was confirmed at GMI2002 (GMI: Global MSF Interoperability).

With Release 2 (R2), MSF was an early implementer of NGN's major functional components of IMS and the end-to-end QoS (quality-of-service) architecture corresponding to the resource and admission control subsystem (RACS). The interoperability of R2 was demonstrated at GMI2004.

4. Recent topics

To enable GMI2006 to test the NGN technology being discussed at ETSI TISPAN[*1], ITU-T FG-NGN[*2], and other organizations, the outputs from those organizations are being incorporated into an architectural model and IA by MSF. NTT has led discussions and proposed contributions to standards bodies focusing on issues including the interfaces and devices (e.g., session border gateway (SBG)) related to interoperability with other carriers and users, as well as protocols between the C-Plane and U-Plane necessary for constructing an even more economical network. Below, to highlight recent topics, we report on the MSF conference in Nagoya held October 18th-20th, 2005.

4.1 Architecture WG

In the Architecture Working Group (WG), in order to test interoperability related to fixed-mobile convergence during the upcoming GMI2006 event, consideration is being given to add 3GPP-defined IMS elements to R2 to produce R3. The specifications for the MSF Release 3 (R3) architecture have almost been fixed. The aim of R3, with the addition of HSS (home subscriber server), CSCF (call session control function), SBG, etc., is to define an architecture for achieving NGN (**Fig. 1**). NTT has co-authored contributions concerning SBC etc. with major carriers (BT and Verizon) and vendors (Cisco, Nortel, etc.), and many of these have been adopted.

4.2 Protocol & Control WG

The Protocol & Control WG has the mission of profiling and defining the IAs for the protocol between the various devices in R3. Currently under consideration are protocols adopted by IMS including SIP (session initiation protocol), MEGACO (media gateway control) and DIAMETER [3].

In R2, the focus of SIP usage was on fixed-line

*1 ETSI TISPAN: Telecommunications and Internet converged Services and Protocols for Advanced Networking project of the European Telecommunications Standards Institute

*2 ITU-T FGNGN: Focus Group on Next Generation Networks in the International Telecommunication Union Telecommunication Standardization Sector

VoIP (voice over IP) services and this was reflected in the IA. At the Nagoya meeting, under NTT's leadership, the functional differences between MSF R2's IA and IMS were identified and it was decided to finalize the IA for R3 at the next meeting in Florida.

The evaluation of MEGACO, DIAMETER, and COPS-PR (common open policy service usage for policy provisioning) has begun as the device-configuration interface between U-Plane devices (edge routers, SBGs, and MGs) and devices such as call agents and bandwidth managers. These are important protocols for achieving control of realtime communications, a goal of MSF. With NTT's leadership, COPS-PR was developed into an IA at the previous MSF conference.

MSF first profiled MEGACO as a protocol for MGC (media gateway controller) and connection gateway control between IP (Internet protocol) networks and the PSTN (public switched telephone network). The effectiveness of using this protocol was proven at GMI2002. Next, MEGACO was profiled as a protocol for controlling access gateways and edge routers from bandwidth managers. The adoption of MEGACO is being considered as a protocol for controlling discrete SBGs: signaling SBG (S-SBG) and data SBG (D-SBG).

Consideration of the DIAMETER protocol began in R3. At the Nagoya conference, it was proposed to adopt DIAMETER as the protocol between the HSS and the application server and between the CSCF and bandwidth management servers, as has been proposed in both 3GPP and ETSI. It is expected that it will be developed into an IA at the next MSF conference.

4.3 Interoperability WG

The Interoperability WG has begun discussions based on drafts for physical scenarios and test procedures in preparation for GMI2006. Because a primary objective of GMI2006 is to achieve fixed-mobile convergence, there was a lively discussion regarding the definition and evaluation methods for roaming between the R3 architecture and IMS. It is expected that the GMI2006 testing procedures will be confirmed at the April 2006 MSF conference in Berlin.

5. Overview of GMI2004

GMI meetings are held once every two years on a global scale. The most recent interoperability tests were held October 4th–6th, 2004 and linked five sites in Japan (NTT Musashino R&D Center), Europe (BT), USA (Qwest, University of New Hampshire), and South Korea (Korean Telecom). In this event, test environments were set up at each site with the various vendors and carrier-brand devices submitted by participating companies. Interoperability tests were conducted according to the test scenario defined by the Interoperability WG not only on site, but also—as the event's name suggests—on a global scale. As shown in **Fig. 2**, the main test items were:

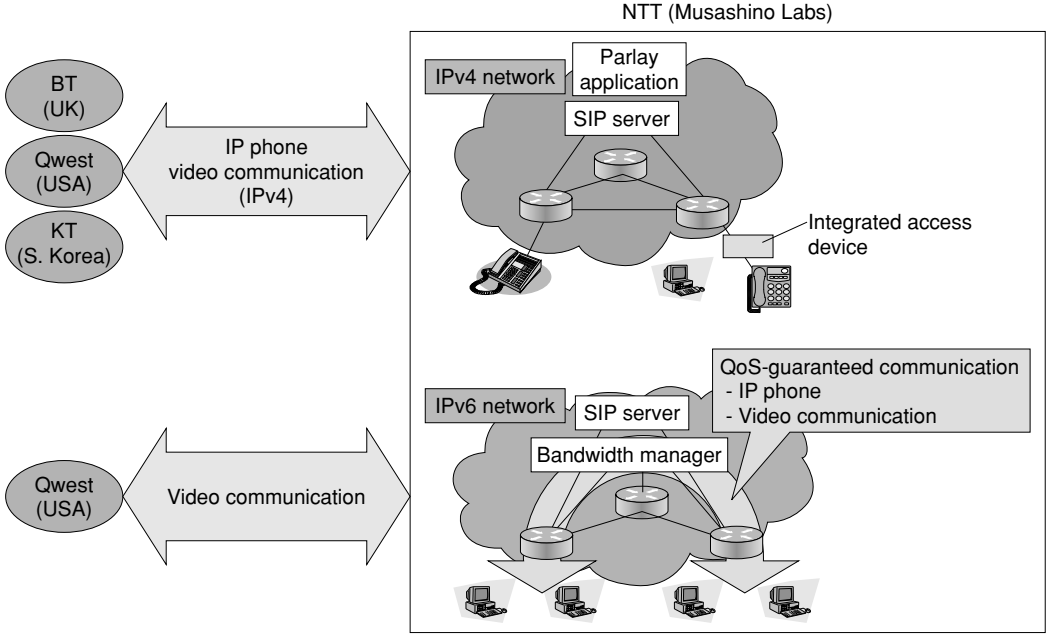

Fig. 2. Items investigated at GMI2004.

- IP telephone communications (IPv4) (including additional services such as forwarding and three-party calling)
- Video communication transmission (IPv4 and IPv6)
- QoS-enabled communications using bandwidth control technology (IPv6)

6. NTT's achievements through GMI2004 participation

As a site host for GMI2004, NTT R&D Laboratories—led by the Service Integration Laboratories and Network Service System Laboratories—set up the testing environment and provided progress management for the event. Furthermore, the Network Service System Laboratories submitted to the testing event its SIP server and bandwidth management technology, which were the fruits of its research. NTT achieved the following results:

(1) Its products were proven to comply with global standards on an implementation basis, through global interoperability testing with products from Japan, Europe, North America, and South Korea.

(2) It was successful in achieving the world's first QoS-enabled communications using bandwidth management technology and secure transmissions in a multi-vendor environment, which makes a statement to the world about NTT's innovativeness.

7. Future outlook

To achieve the goal of 30 million fiber-optic access subscribers and broadband ubiquitous service announced in the NTT Group's medium-term business strategy in November 2004, NTT needs to:

(1) Build an NGN quickly and economically by assembling standards-compliant products

(2) Ensure global interoperability to provide a service platform that can be used anytime, anywhere.

This implies that achieving interoperability both within our network and connecting to other networks is crucial for our success. Therefore, to meet these two goals, NTT laboratories will aggressively participate in interoperability test envents such as MSF GMI and develop international standards-based technologies.

References

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[2] K. Miyake and T. Ohba, "MSF Osaka Meeting Report," NTT Review, Vol. 14, No. 4, pp. 54-58, 2002.

[3] http://diameter.org/

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