

GICTF Inter-cloud Interface Overview

July 25, 2012

Ryuichi Ogawa*, Atsuhiko Goto**

Global Inter-Cloud Technology Forum

*NEC Corporation

**Institute of Information Security

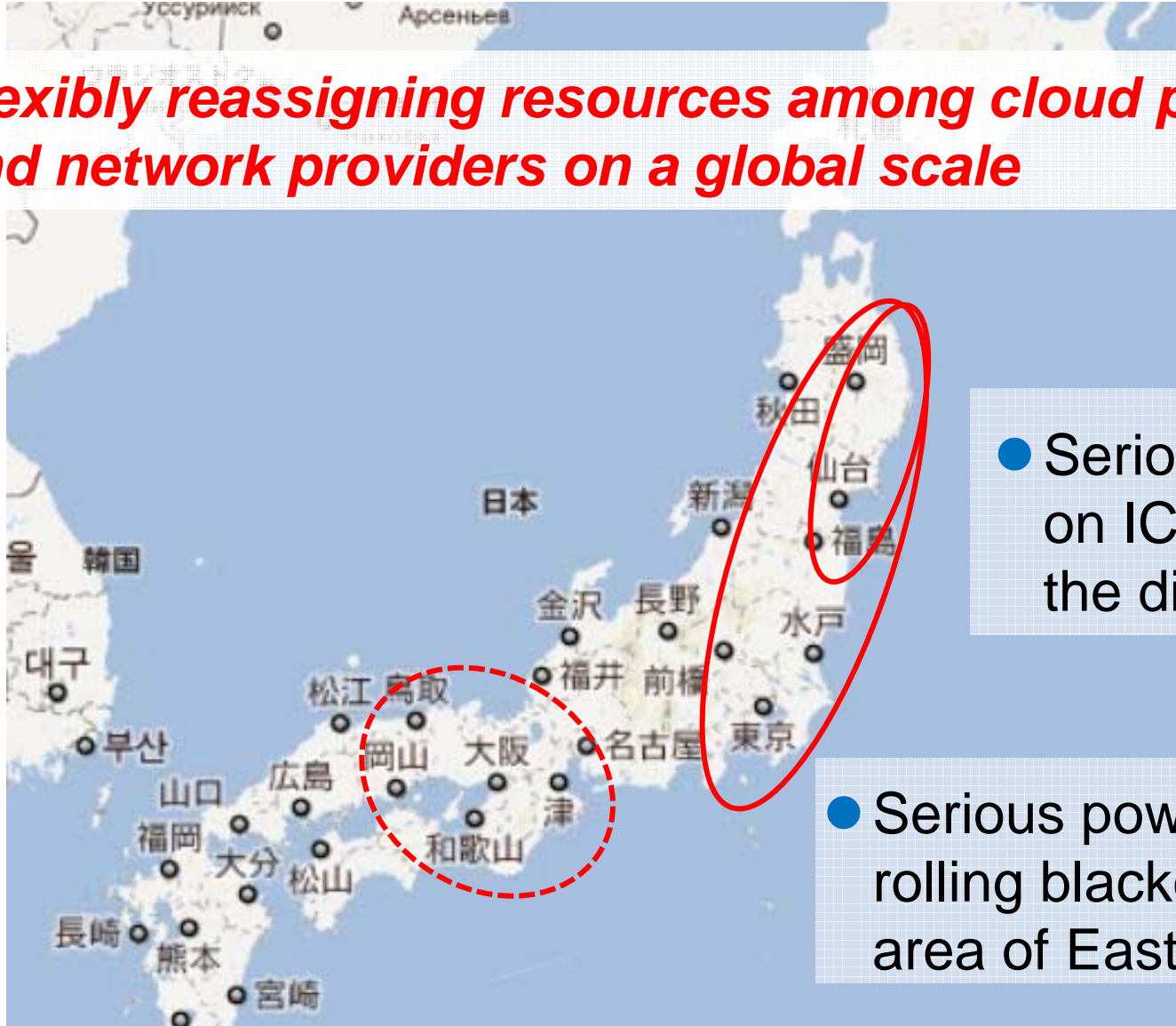
- Need for inter-cloud computing and networking
- GICTF overview
 - Related research project
- Inter-cloud interface overview
 - White paper
 - Information flows
 - Data model
- Standardization activities
 - Standardization in ITU-T
 - DMTF alliance
- Summary

Need for inter-cloud computing and networking

- Cloud service adoption in the field of Mission Critical Applications
 - National Administration
 - Medical Applications : EHR, PHR
 - Disaster Recovery Management
 - Can “single cloud” solve severe requirements for mission critical applications?
- ⇒ Collaborative inter-cloud computing and networking are necessary

GICTF Lessons learned from Tohoku earthquake

Flexibly reassigning resources among cloud providers and network providers on a global scale



- Serious damage on ICT facilities in the disaster area

- Serious power shortage / rolling blackout in wide area of East Japan

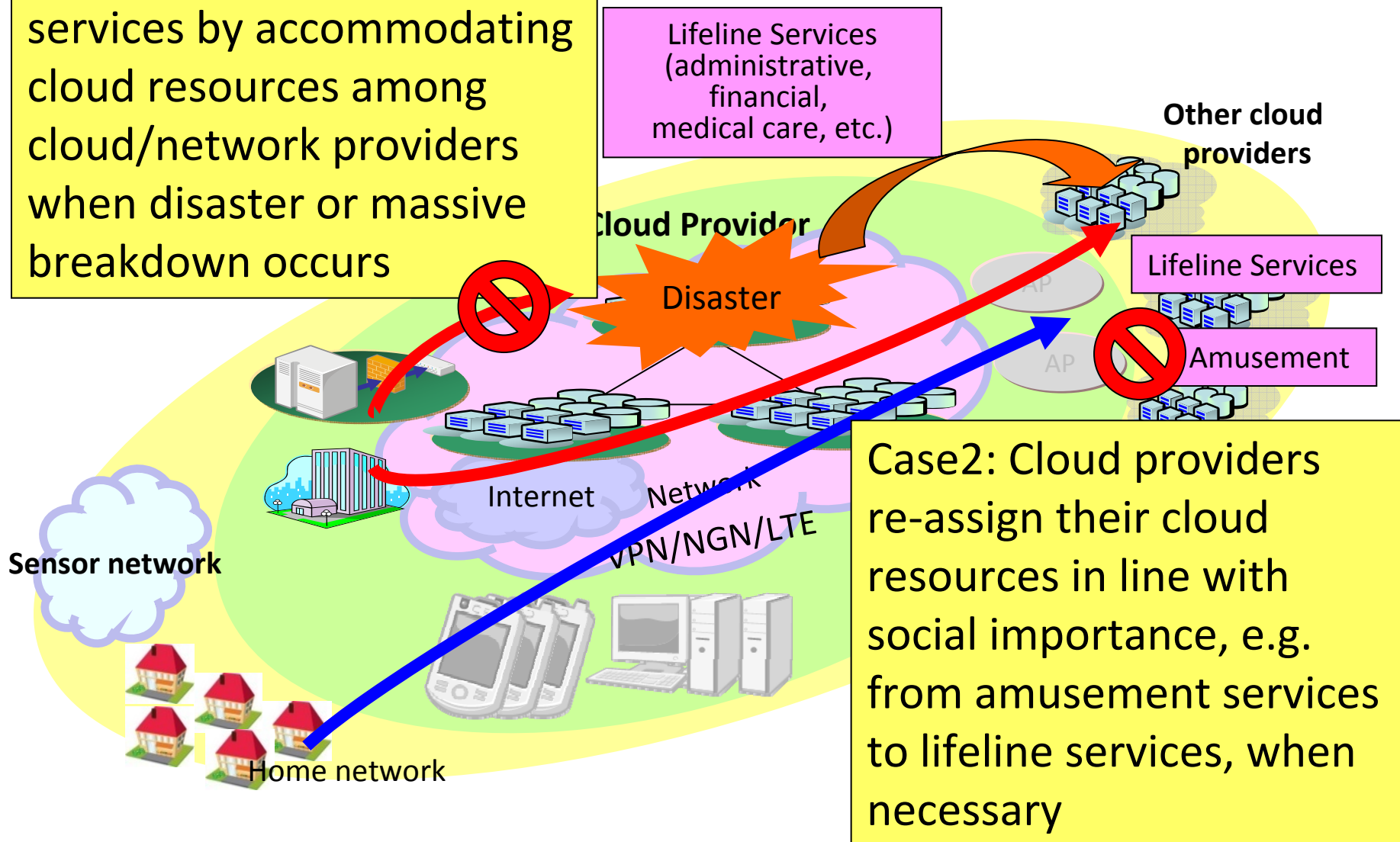
Communication facilities were the worst affected

- Transmission lines: 90 routes were cut off
- 18 telco buildings were fully destroyed, and 23 buildings were flooded
- 65,000 telephone poles were destroyed by the flood



Secure inter-cloud for “Lifeline services”

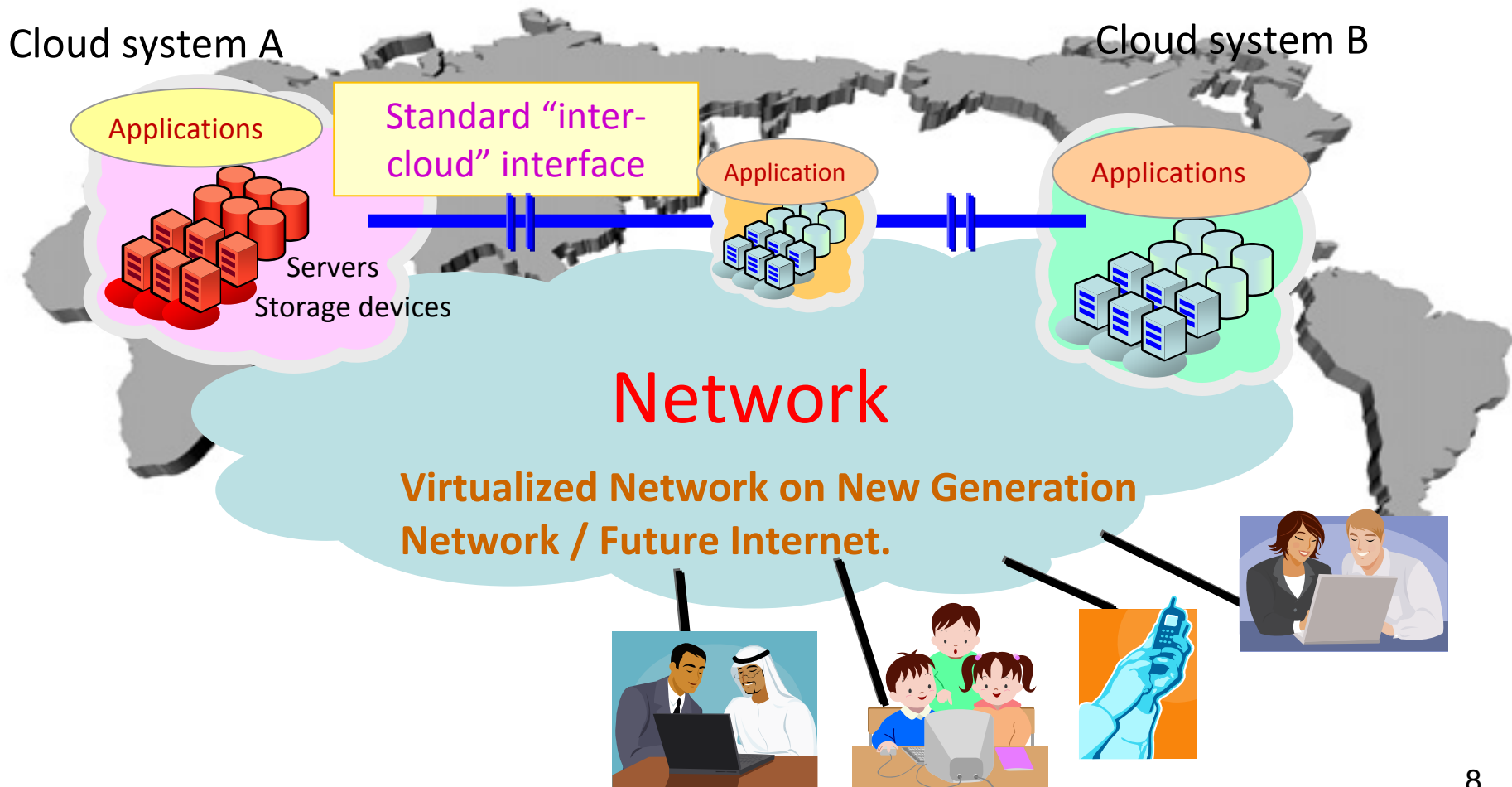
Case1: Migrate lifeline services by accommodating cloud resources among cloud/network providers when disaster or massive breakdown occurs



GICTF OVERVIEW

GICTF Mission

- Promotes the global open inter-cloud technologies and standardization through collaboration among academia, government and industry



Activity summary

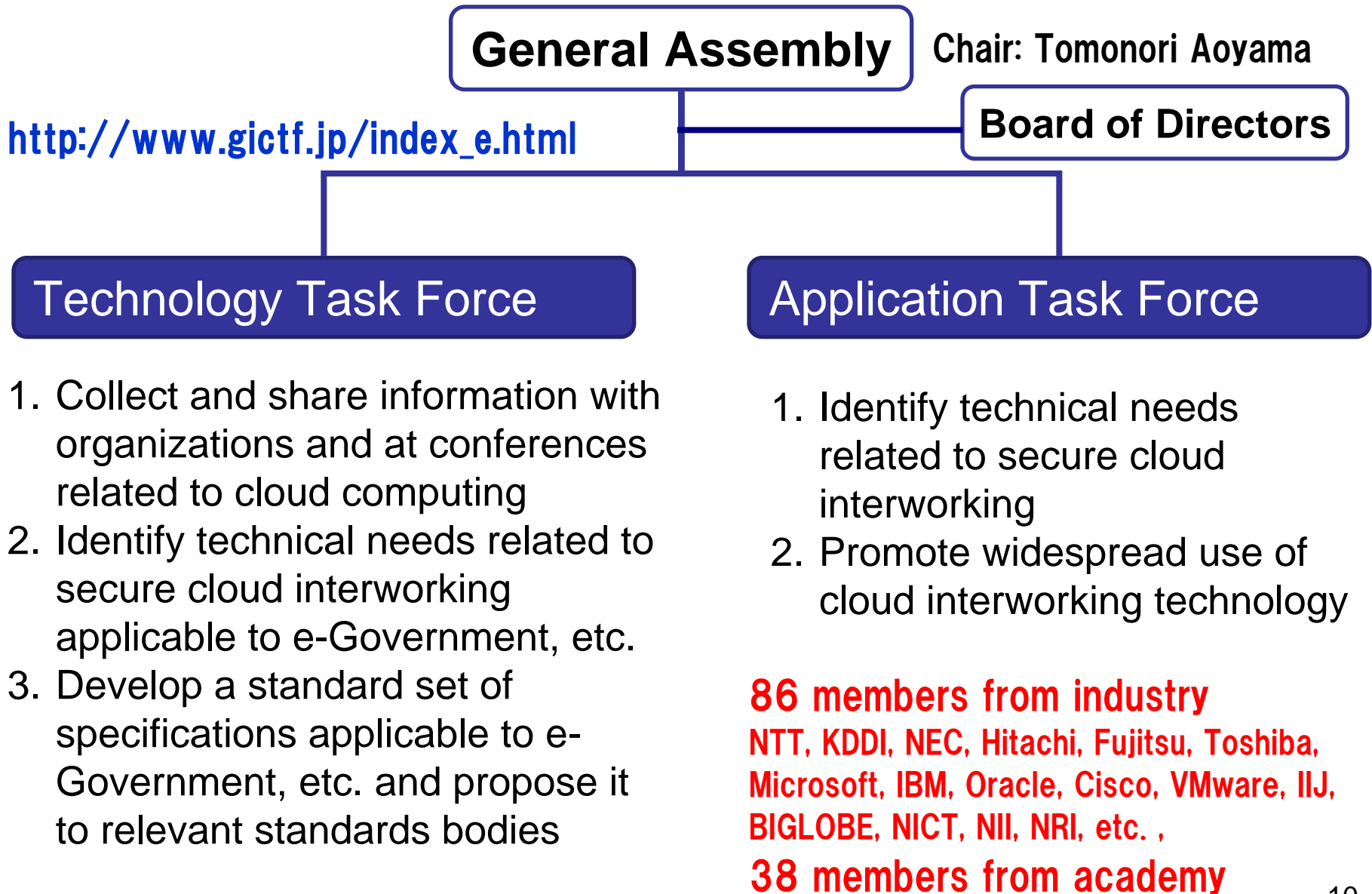
- Main activities:
 - Identify technical needs for secure “inter-cloud technology”
 - Raise awareness of users both in industry, government and communities
- Membership (as of July 2012)
 - 86 enterprises, 38 national laboratories and universities in Japan
 - Observer: MIC*, METI**
- Standardization/alliance partners
 - ITU-T SG13 (since January 2012)
 - DMTF (since June 2012)



*MIC: Ministry of Internal affair and Communication

**METI: Ministry of Economy, Trade and Industry

Organization

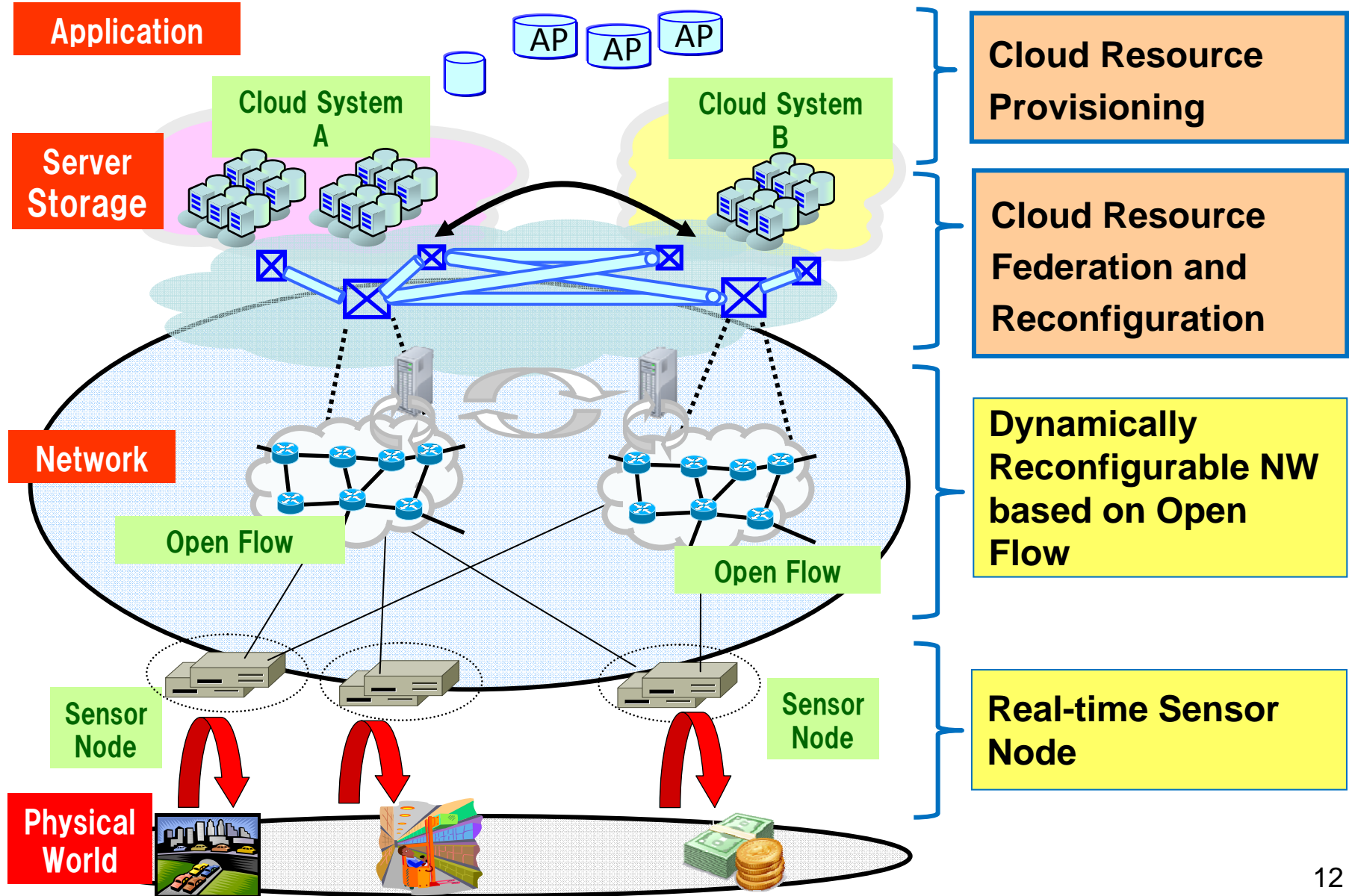


Major deliverables

- *“Use case and functional requirements for Inter-Cloud Computing”* E/Aug 2010
- *“Inter-Cloud interface specification on protocols”* J/Dec 2011, E/Apr 2012
- *“Inter-Cloud interface specification on resources data model for network control”* J/Dec 2011, E/Apr 2012
- *“Network and technical requirements in support of Inter-Cloud”* J/Dec 2011 E/Apr 2012

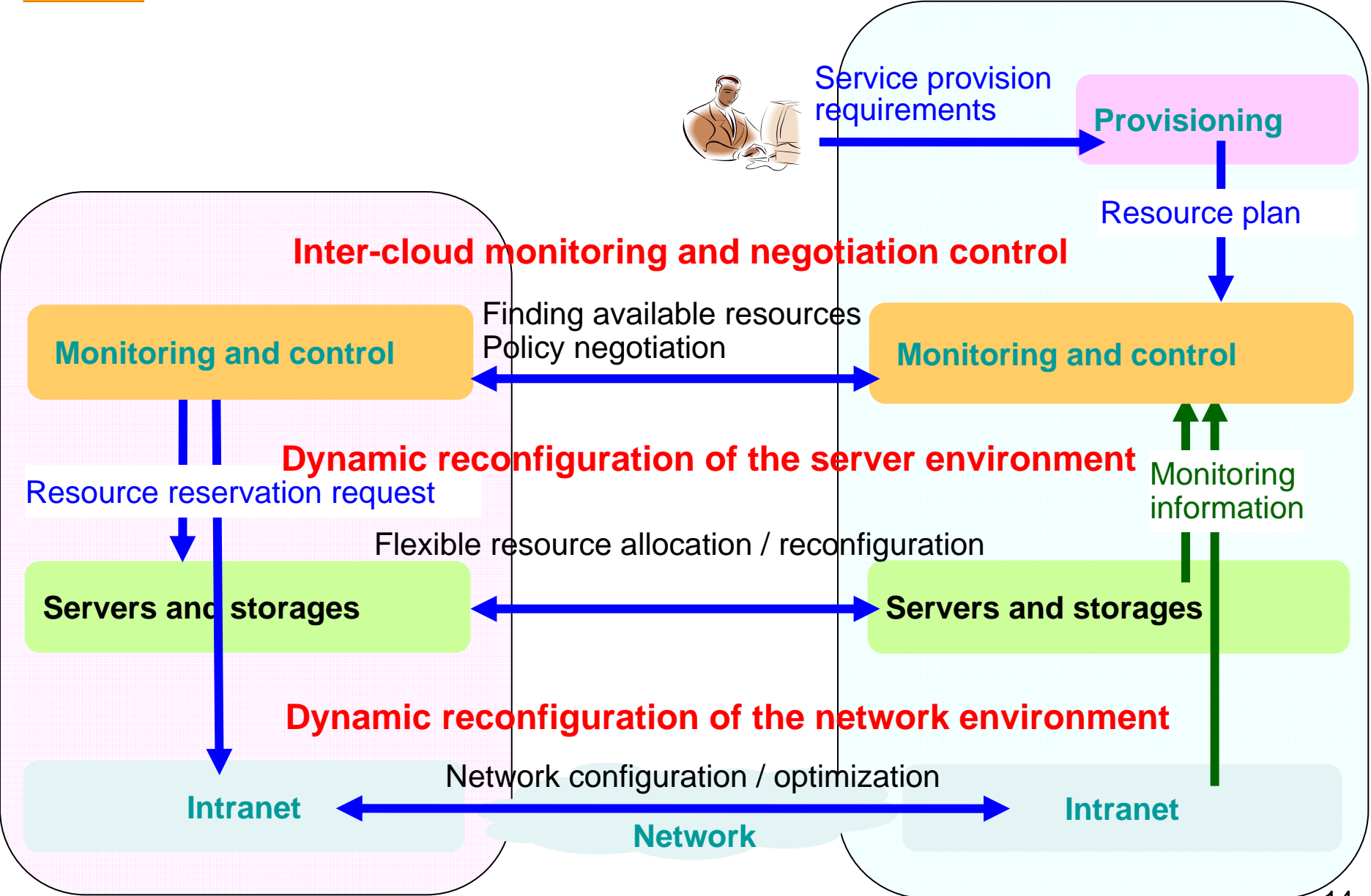
GICTF

Related research project: Highly Reliable Inter-Cloud Systems*

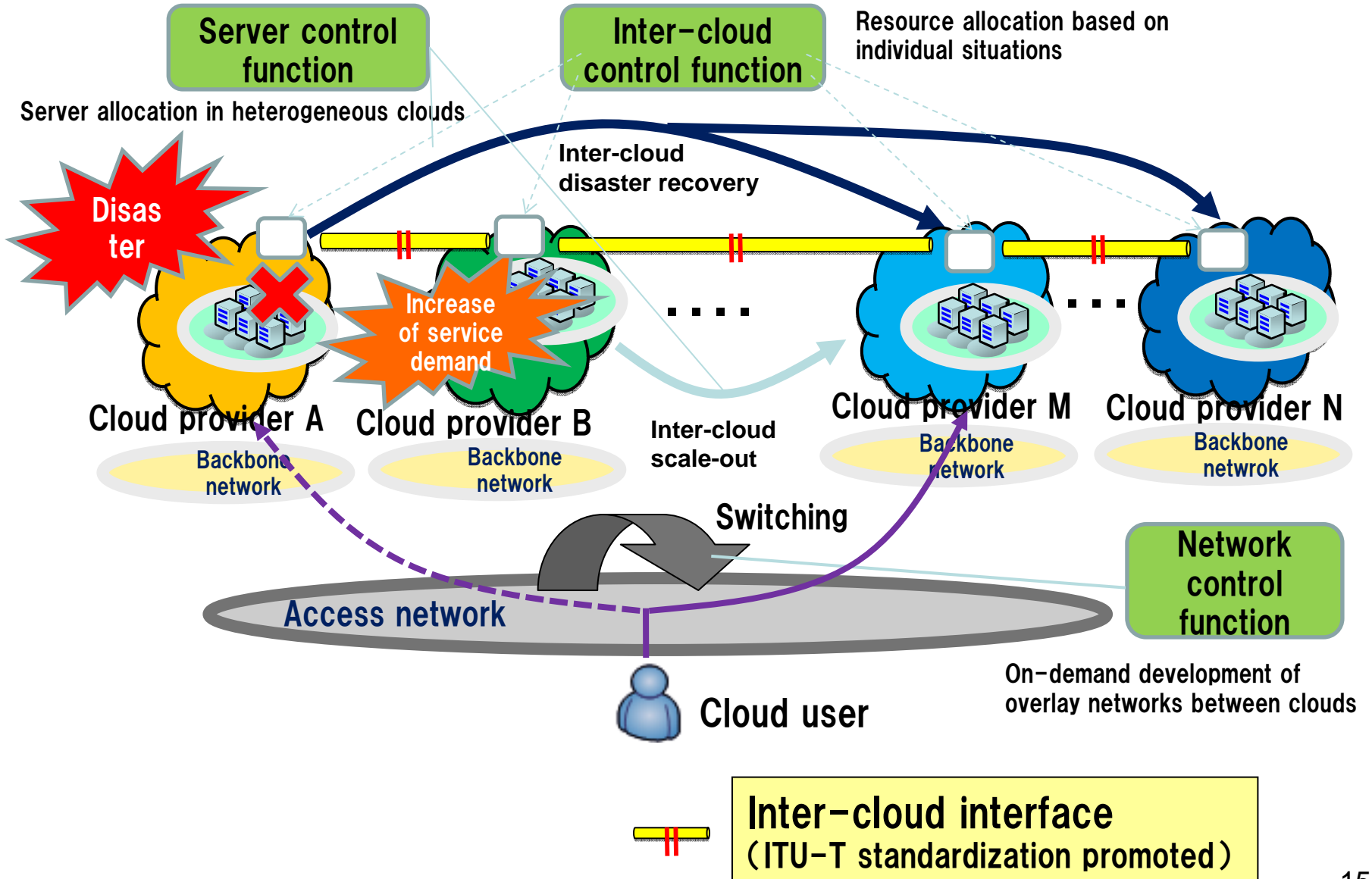


INTER-CLOUD INTERFACE OVERVIEW

Inter-cloud interface design



Inter-cloud interface and control mechanisms



GICTF White Paper

Use Cases and Functional Requirements for Inter-Cloud Computing

August 9, 2010

[Contents]

- *Use cases* of inter-cloud computing
- *Procedures* in use cases of inter-cloud computing
- *Functional requirements* for inter-cloud computing
- *Functional structure and interfaces* of cloud systems in inter-cloud computing

GICTF White Paper

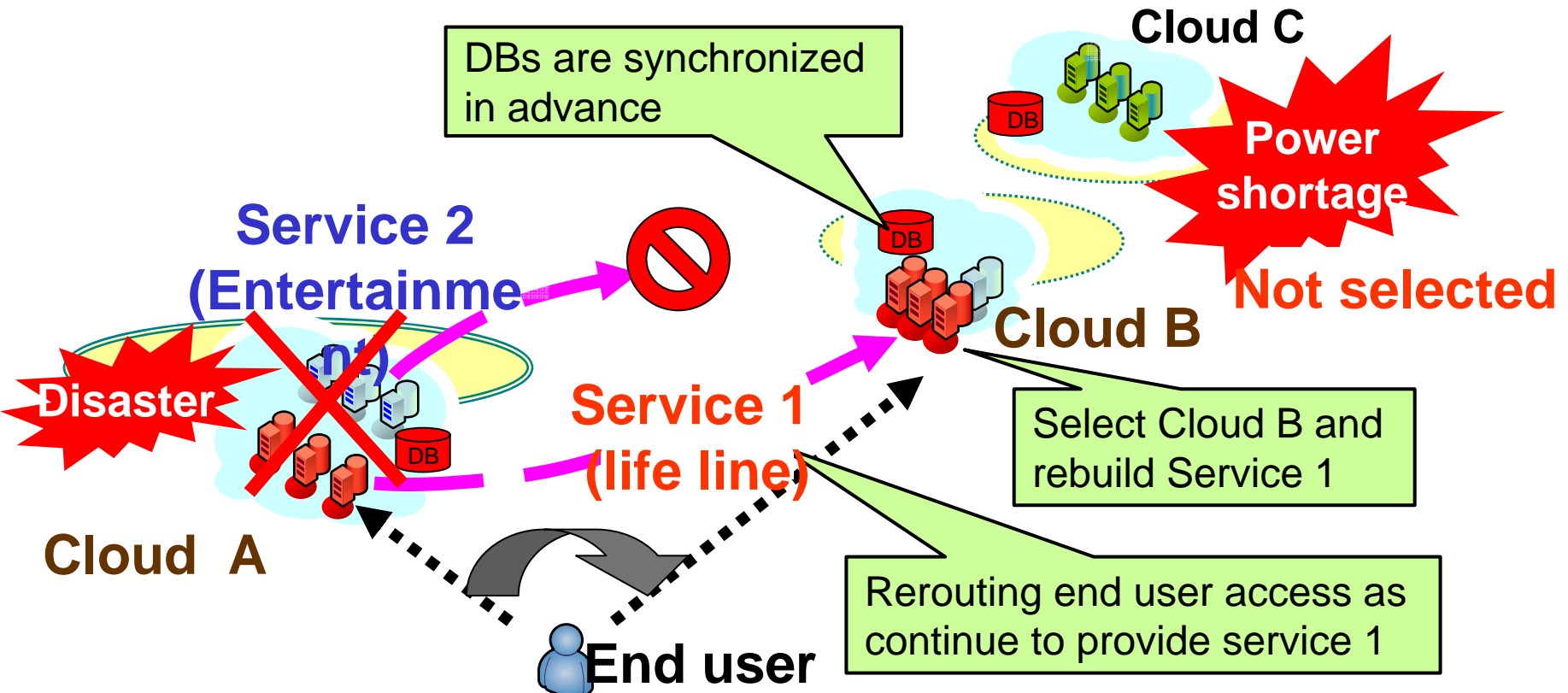
Table of contents

1 Introduction	1
2 Definition of cloud computing	2
3 Quality requirements for services and cloud provider's SLA	5
3.1 Quality requirements for services	5
3.2 Cloud provider's SLA	7
4 Needs for and purposes of inter-cloud computing	8
4.1 Guaranteed end-to-end quality for each service	8
4.1.1 Guaranteed performance	8
4.1.2 Guaranteed availability	9
4.2 Convenience of service cooperation	9
5 Use cases of inter-cloud computing	10
5.1 Guaranteed end-to-end quality of service	10
5.1.1 Guaranteed performance	10
5.1.2 Guaranteed availability	13
5.2 Enhanced convenience by service cooperation	15
5.3 Service continuity	16
5.4 Market transactions via brokers	17
6 Procedures in use cases of inter-cloud computing	18
6.1 Procedures for guaranteeing performance through inter-cloud interactions	18
6.2 Procedures for recovering service and guaranteeing availability by inter-cloud interaction	23
7 Functional requirements for inter-cloud computing	29
7.1 Matching between service consumer's quality requirements and SLA	29
7.2 Monitoring (resource, service, and dead/alive)	29
7.3 Provisioning	30
7.4 Resource discovery and securement	31
7.5 Resource management	32
7.6 Service Setup	32
7.7 Authentication interworking	33
7.8 Network Interworking	35
7.9 Alternation and Retrieval of data for access route from consumer	35
7.10 Releasing resources	36
8 Functional structure and interfaces of cloud systems in inter-cloud computing	36
8.1 Functional structure	36
8.2 Interfaces	38

Copyright©2010 Global Inter-Cloud Technology Forum. All Rights Reserved.

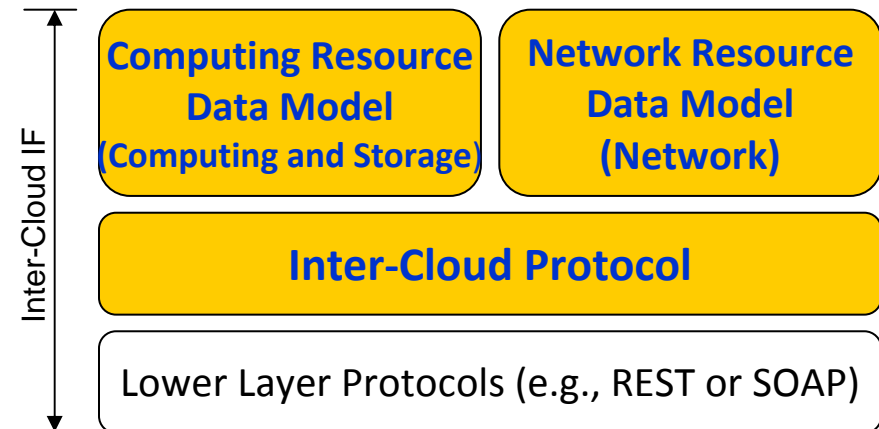
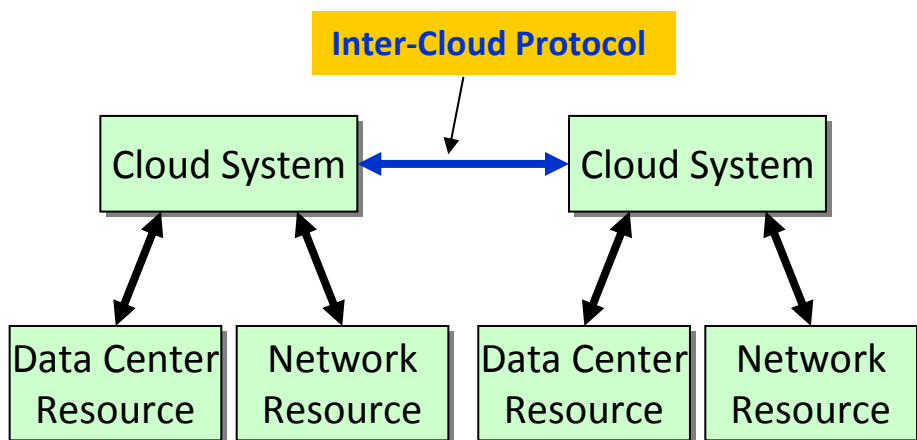
Use case example: disaster recovery

Discovering available cloud resources among clouds in other areas, then *dynamically* rebuilding cloud services in the event of a disaster or a large-scale failure



Definition of Inter-cloud Interface

- The interface between two cloud systems administered by different operators
- Three layer model
 - Lower layer protocol: assumed as some XML message exchange, e.g., REST or SOAP
 - Inter-cloud protocol: Information flows, message semantics with associated parameters specified
 - Data models for network resources specified
 - Data models for computing and storage referenced to other SDO's specifications



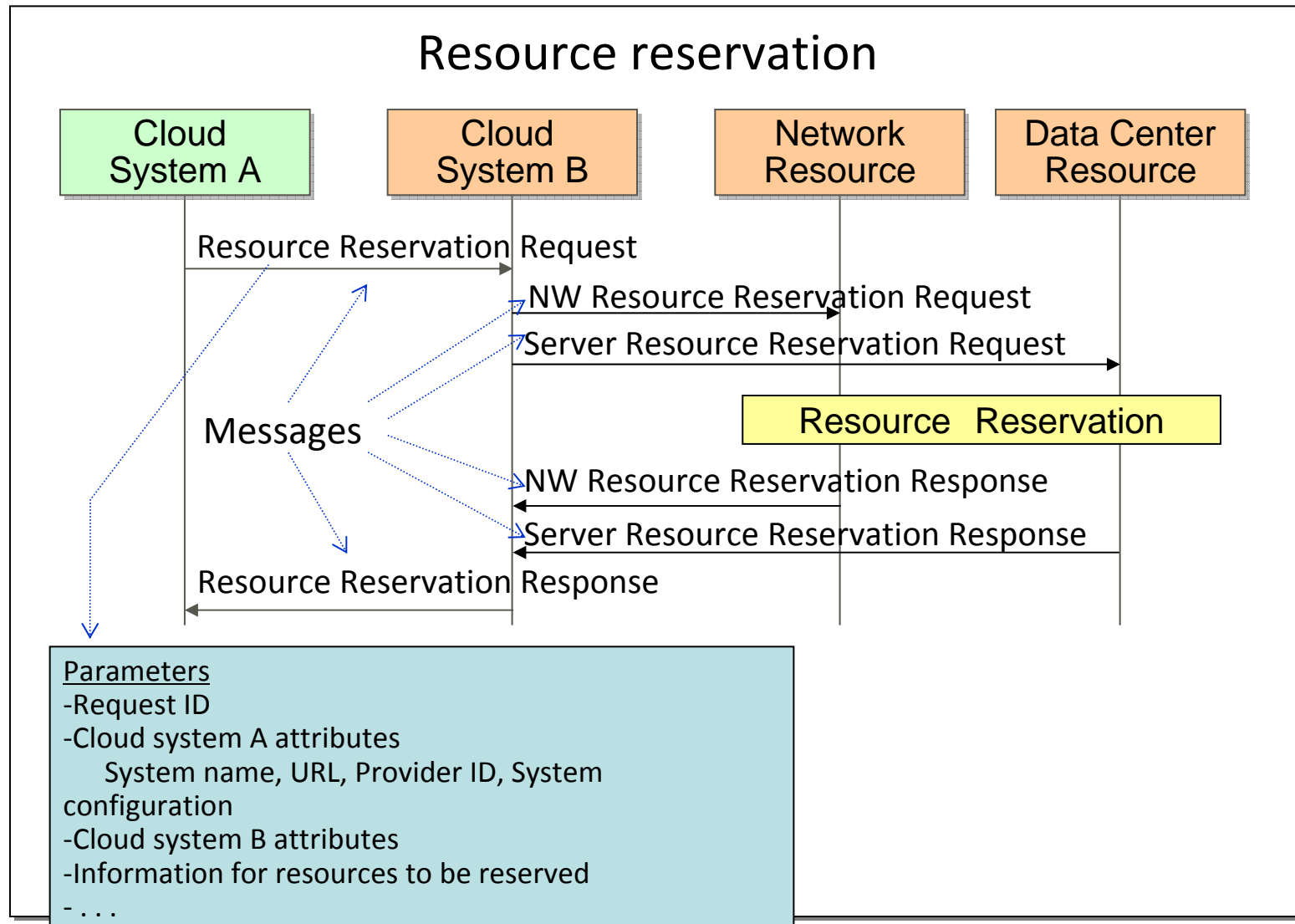
Information flow

- Definition of three resource states
 - unused, reserved, used
- Information flows between cloud providers
 - Notification of system activation and being ready
 - Resource discovery, reservation, usage monitoring, activation, and release
 - Data synchronization between cloud providers and delegation of the control
- Messages to be exchanged with their parameters

Inter-cloud message examples

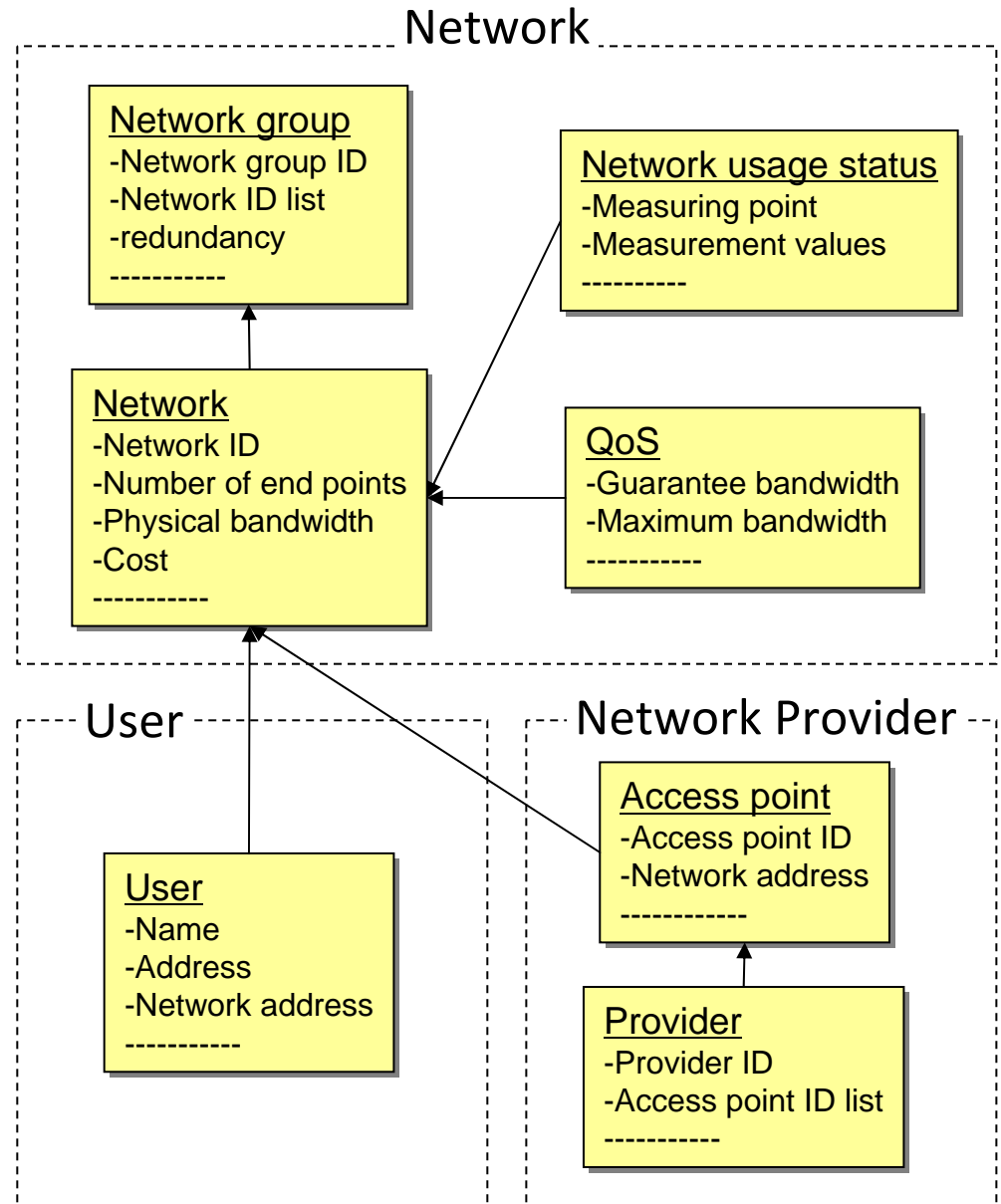
ICS Startup Notice	Cloud A Informs its partner (Cloud B) of its inter-cloud service start-up.
Resource Information	Cloud A requests available resource information to Cloud B.
Resource Reservation	Cloud A reserves Cloud B resources from derived resource information.
Resource Reservation Cancellation	Cloud A cancels the reservation of Cloud B resources.
Resource Securing	Cloud A secures Cloud B resources.
Resource Monitoring	Cloud A monitors the resource control status of Cloud B.
Resource Switchover	Cloud A requests resource switchover to Cloud B.
Resource Switchover Preparation	Cloud A requests resource switchover preparation to Cloud B.
Resource Release	Cloud A requests resource release to Cloud B.

Information flow example for resource reservation



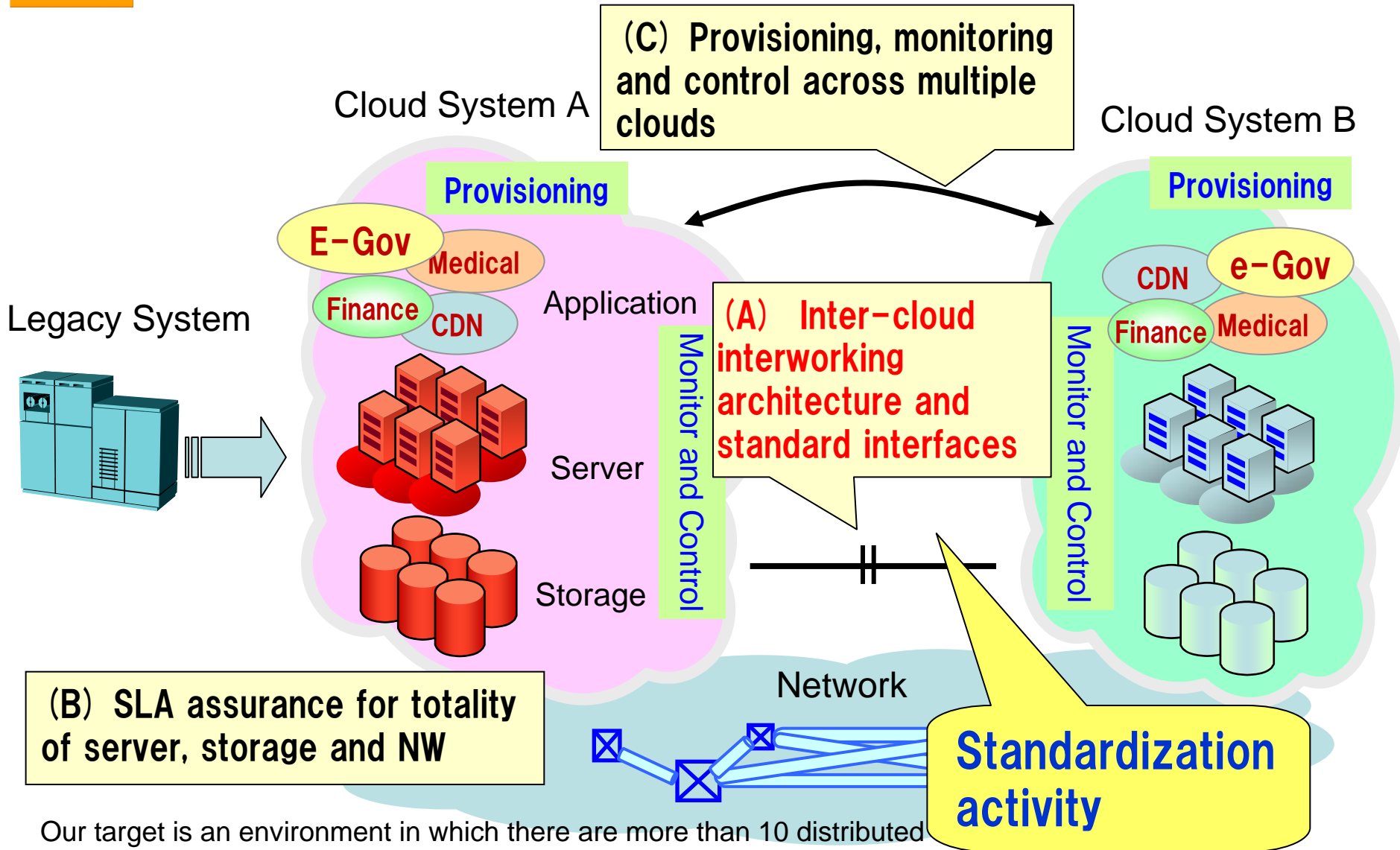
GICTF Data model

- Network resource model
 - Three-type network resources:
 - Network
 - Network Provider
 - User
 - Definition of classes and example descriptions in XML



STANDARDIZATION ACTIVITIES

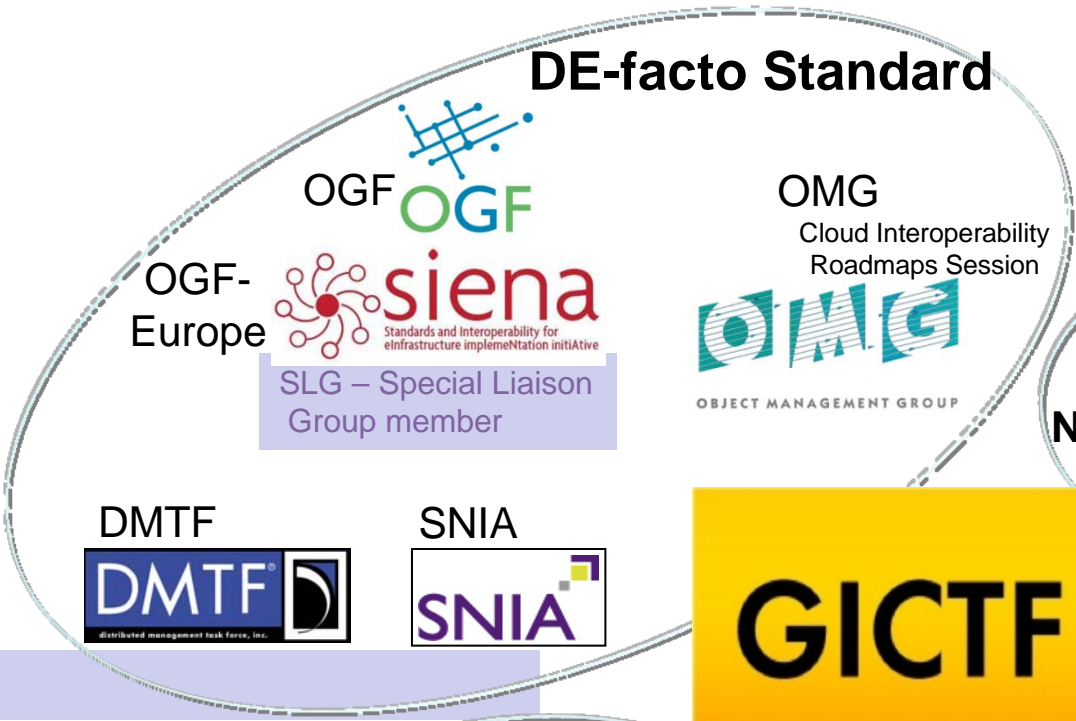
Key issues for inter-cloud service federation



Our target is an environment in which there are more than 10 distributed consisting of several hundreds of applications and several thousands of virtual servers.

Inter-cloud related SDOs

DE-facto Standard



US Government

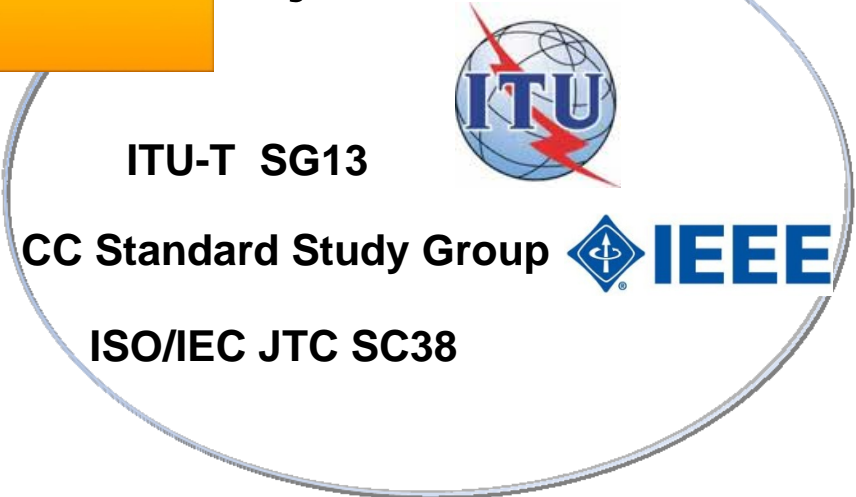
NIST CC forum 

DMTF 
distributed management task force, inc.


SNIA 



De-jure Standard



Open Source Community

OpenStack 
openstack

Cloud Business

Google, Salesforce, Amazon, etc.

STANDARDIZATION IN ITU-T

Standardization process

- Outlines and key features of the GICTF White Paper was submitted to ITU-T FGCC and included in its deliverables.
- Y.ccic was organized in SG13 WP6, targetting to make a recommendation in 4Q of 2013.

2010	2011	2012	2013
------	------	------	------

GICTF

- White Paper: “Use case and functional requirements”
- White Paper: “Inter-cloud Interface”
- White Paper: “Inter-cloud data-model”

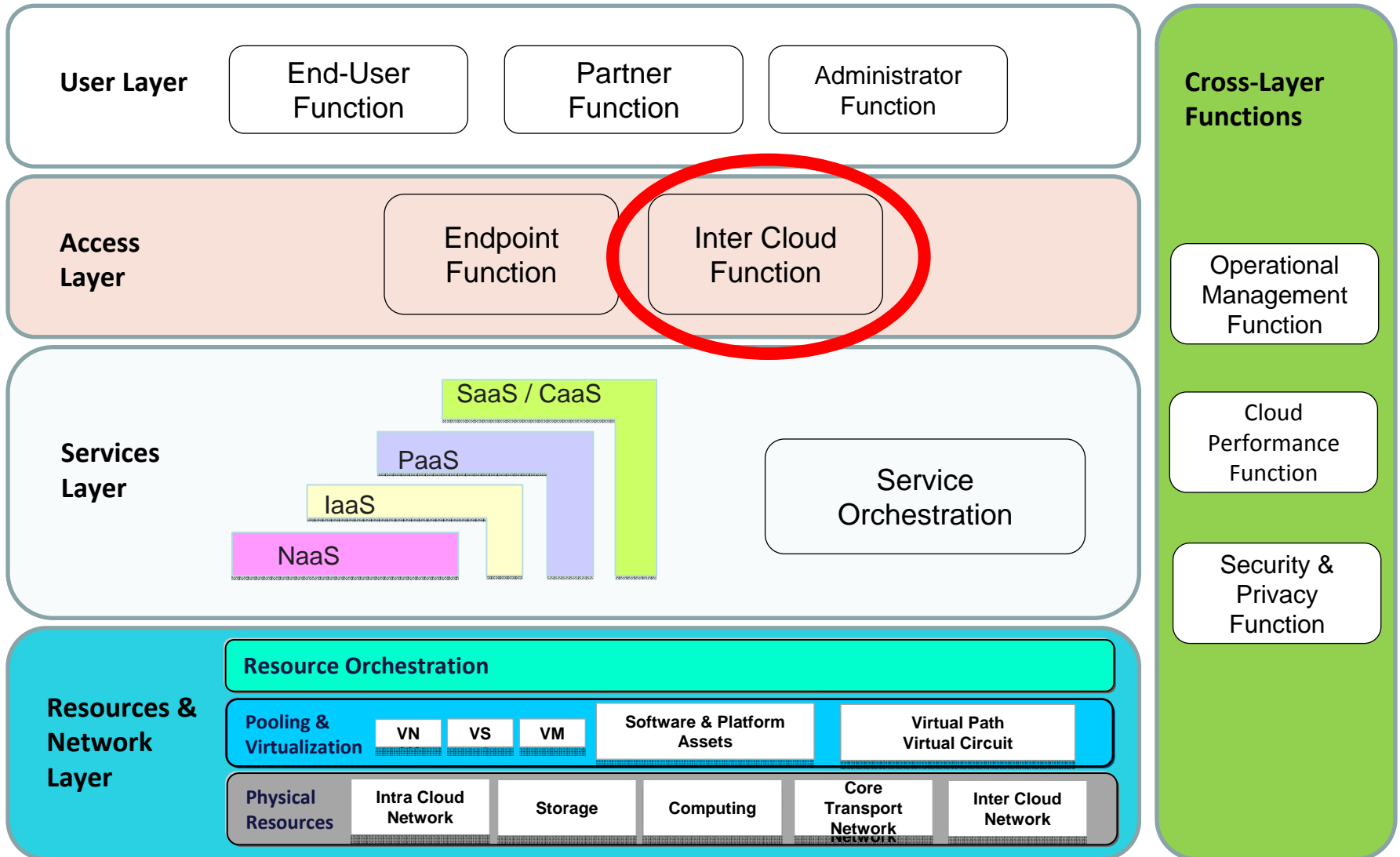
ITU-T

FGCC:
(Focus Group on
Cloud Computing)

SG13 WP6 (Cloud)

- Y.ccdef (Definition)
- Y.ccrs (Reference Architecture)
- Y.cceco (ecosystem, etc.)
- Y.ccinfra (Infrastructure)
- Y.e2eccrmr (Resources Management)
- **Y.ccic (Inter-cloud)**
- Y.daas (DaaS)

GICTF Inter-cloud in Cloud Functional Architecture



SG13 WP6 discussion issues

Priority	Rec.	Q.	Short Title	Target for Consent	Editors
1	Y.ccdef	26	Cloud Computing Definition and Vocabulary	Q4 2013	Olivier Colas
1	Y.ccra	27	Cloud Computing Reference Architecture	Q4 2013	Olivier LeGrand Mark Jeffrey
2	Y.cceco	26	Cloud computing: ecosystem, use cases, and general requirements	Q1 2013	Ying Chen
2	Y. ccinfra	27	Cloud Computing Infrastructure Functional requirements	Q1 2013	Yongshun Cai Emil Kowalczyk
2	Y.e2eccrmr	28	End to End Cloud Computing Resources Management Requirements	Q1 2013	Richard Brackney Yongxiang Wang
3	Y.ccic	27	Framework of Inter-cloud for Network and Infrastructure	Q4 2013	Naotaka Morita Weixiang Shao
3	Y.daas	26	Requirements and Architecture of Desktop as a Service		Myeong-Hoon Oh Aaron Zhang

Meeting schedules and working documents

2012 4-6	7-9	10-12	2013 1-3	4-6	7-9	10-12
-------------	-----	-------	-------------	-----	-----	-------

ISO/IEC
JTC 1
SC38
WG3

▲
May
(5/21-25)
SC38
Berlin

▲
Sept.
(9/24-28)
SC38
Stockholm

▲
April
(4/8-12)
SC38
Madrid

▲
Sept.
(9/xx)
SC38
TBD

ITU-T
SG13
WP6

▲
April
(4/16-20)
Cloud Qs
Geneva

▲
June
(6/4-15)
SG13
Geneva

▲
Oct.
(10/15-19)
Cloud Qs, WS
Seattle

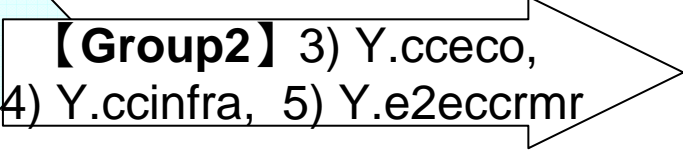
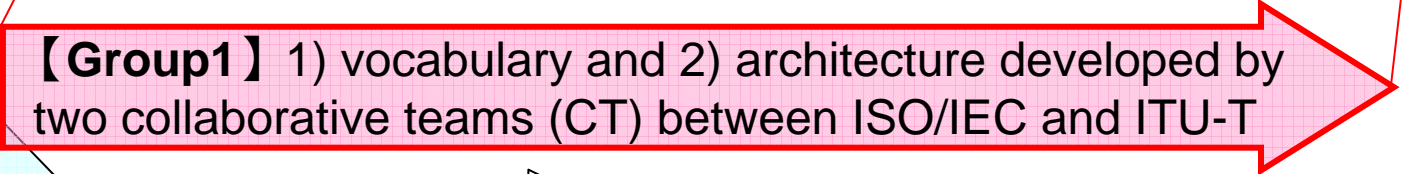
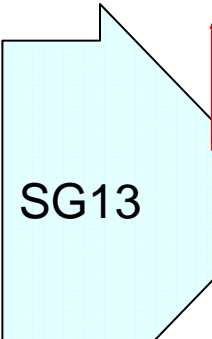
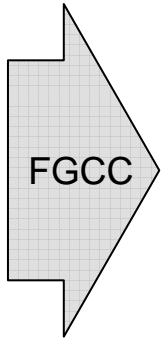
Cloud Collaborative Team

▲
Feb.
(2/18-3/1)
SG13
Geneva

▲
June
(6/xx)
Cloud Qs, WS
Geneva

▲
Nov.
(11/4-15)
SG13
Geneva

Working documents



- Use cases enhancement
- Distinction between cloud control and cloud management, or clear definitions of them
- Model and terminology synchronization with ITU-T/ISO collaborative work

DMTF ALLIANCE

The screenshot shows the DMTF website with the following elements:

- DMTF Logo:** DISTRIBUTED MANAGEMENT TASK FORCE, INC. with the tagline "DMTF enables more effective management of IT systems worldwide."
- Navigation:** Workspace, Members Area, DMTF 日本, Home, About DMTF, Standards & Technology, News & Events, Learning Center, Conformance, Join Us.
- Search:** Google™ Custom Search with a Search button.
- Breadcrumbs:** Home > DMTF Announces Partnership with Global Inter-Cloud Technology Forum (GICTF) for Cloud Management
- Section Header:** DMTF Announces Partnership with Global Inter-Cloud Technology Forum (GICTF) for Cloud Management
- Text:**

DMTF has announced that it is partnering with the Global Inter-Cloud Technology Forum (GICTF) to collaborate on the development and adoption of cloud management standards.

GICTF, organized with the approval of Ministry of Internal Affairs and Communications of Japan is a non-profit organization for development and standardization of cloud computing technologies and interfaces to achieve inter-cloud collaboration. DMTF has been working to develop and promote cloud standards, such as the Cloud Infrastructure Management Interface (CIMI) through their cloud management initiative, which includes contributions from various working groups.

Through this alliance partnership, the two organizations will collaborate on cloud standards development to coordinate their cloud model/terminology and their inter-cloud management use cases and resource models. Additionally, DMTF's CIMI standard will serve as a good reference to connect GICTF's inter-cloud interface to DMTF standards.

For more information on DMTF's cloud work, visit <http://dmf.org/cloud>. For more information about GICTF, visit http://www.gictf.jp/index_e.html.
- Footer:** Copyright © 2012 DMTF. All rights reserved. Policies | Site Map | Contact Us | Administrative Login. Social media links for Twitter and RSS.

Issues to discuss

- Cloud management model/terminology
 - Cloud ecosystem, role and actor, etc.
- Inter-cloud management use cases and resource models:
 - Aligning with DMTF CIMI and other DMTF specifications
- Issues arising in SG13 WP6 discussions
 - E.g. Scope of cloud management model

Alliance benefits

- To GICTF
 - Accelerate ITU-T standardization by polishing the proposal technically sound and feasible
- To DMTF
 - Utilize inter-cloud use cases and models to enhance DMTF specifications
- To cloud communities
 - Promote inter-cloud related alliance in cloud SDOs and OSS communities

Summary

- Inter-cloud computing and networking are essential for achieving 'lifeline' or mission critical social services, and must be based on appropriate global standards.
- GICTF is a project-driven organization for the promotion and standardization of such inter-cloud interface and now working with ITU-T and DMTF.
- GICTF has been and will be contributing to inter-cloud technologies development and standardization, sharing the inter-cloud use cases and technologies with open alliance partners.

THANK YOU!