

IEEE P2302 – “Intercloud”

Standard for Intercloud Interoperability and Federation (SIIF)

Technical Kick-Off

David R. Bernstein
Chair, IEEE P2302

Friday, 15 July 2011
EMC, Santa Clara, CA





P2302 Scope

The working group will develop the Standard for Intercloud Interoperability and Federation (SIIF).

This standard defines topology, functions, and governance for cloud-to-cloud interoperability and federation.

Topological elements include clouds, roots, exchanges (which mediate governance between clouds), and gateways (which mediate data exchange between clouds).

Functional elements include name spaces, presence, messaging, resource ontologies (including standardized units of measurement), and trust infrastructure. Governance elements include registration, geo-independence, trust anchor, and potentially compliance and audit.

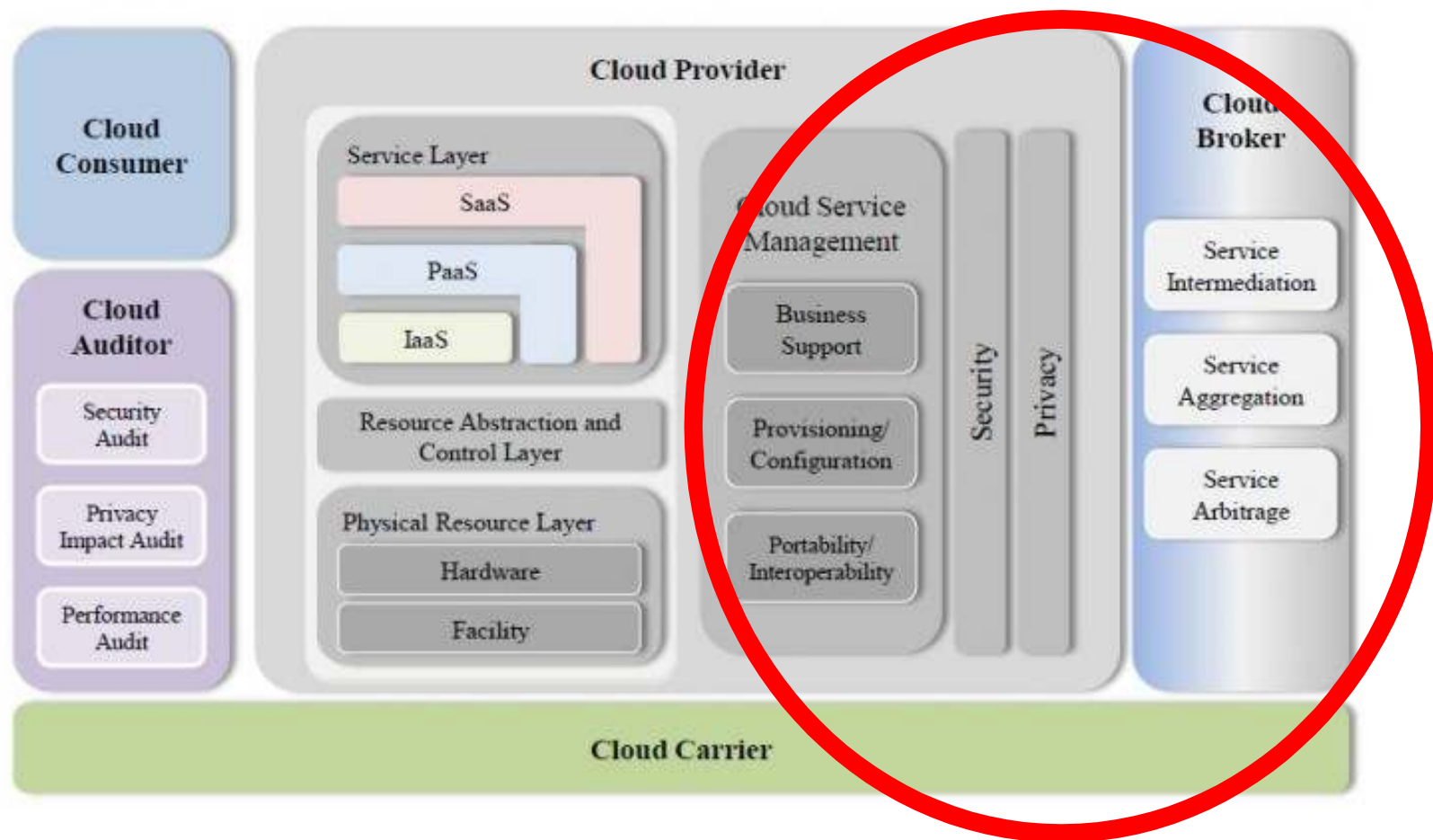
The standard does not address intra-cloud (within cloud) operation, as this is cloud implementation-specific, nor does it address proprietary hybrid-cloud implementations.

P2302 Purpose

This standard creates an economy amongst cloud providers that is transparent to users and applications, which provides for a dynamic infrastructure that can support evolving business models.

In addition to the technical issues, appropriate infrastructure for economic audit and settlement must exist.

NIST Reference Cloud Architecture



http://collaborate.nist.gov/twiki-cloud-computing/pub/CloudComputing/ReferenceArchitectureTaxonomy/NIST_CC_Reference_Architecture_v1_March_30_2011.pdf

Intercloud Awareness Rises

GovIT: Blog Feed Post

Cloud Federation and the Intercloud

Advances in federation are good news for companies considering a move to the cloud no longer need to be custom

BY ELLEN RUBIN

ARTICLE

JANUARY 25, 2010 09:30 AM EST

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5th International Cloud Ex

Last week's post explored federated enterprises to move workloads and external clouds according to requirements. Advances in federated companies considering a move to the cloud since need to be custom projects and applications no longer coupled to a particular cloud.

To follow up, there's been lots of discussion recently "Intercloud," a direction for cloud computing that federation and ties in with much of our work at Cloud

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We have the internet: now we need the intercloud, says Vint Cerf

With "cloud computing" growing in importance, Google's Vint Cerf thinks it's time to start working on "intercloud" standards and protocols so your data doesn't get trapped in one

The 'Intercloud' and the Future of Comp



DevCentral > Weblogs > Lori MacVittie - Two Different S

Pursuit of Intercloud is Practical not P

posted on Friday, January 08, 2010 3:56 AM

Kicking off the new year (and a new decade) with a lively infancy is always a good thing. Fred Cummins over at HP and caught the eye of several of us for whom Intercloud the year by declaring the concept of Intercloud "not yet

"If this elastic mesh is provided by a single cloud provider, then it is simply a different spin on computing. If it is a mesh of independent cloud providers, sharing workloads, then it is a vision that is not worth concern within the next decade. [emphasis added]

I'm going to have to disagree with Fred for two reasons. The first is based on the rate of change and innovation technology in the last decade that certainly points to the next decade being just as disruptive. Consider that ago, in the year 2000, most of the web as it exists today – Web 2.0, APIs, integration, collaboration, video, user-generated content – didn't exist. From a technology perspective virtualization wasn't even a twinkle in and in the infrastructure world, well, we were just beginning to explore the advantages of moving software solutions to hardware and hadn't fully managed to integrate infrastructure solutions let alone anything else.

The rate of change in technology makes a "decade" in real time more like a century in technology-time, as for innovation and use of new technology goes. So to say that the vision of Intercloud isn't worth concern for a decade isn't realistic. It is immensely more practical to consider where we want to be in ten years and head in that direction than it is to stand pat and let our options essentially stagnate.

The second reason I'm going to disagree with Fred is on the basis that Intercloud is not an "exclusive or" concept. We

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07.04.2010, 10:00

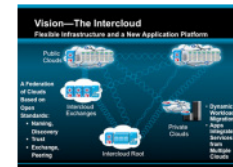
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Intercloud: Internet der Zukunft wird sichtbar

Wie sieht das Netz der Zukunft aus? Experten glauben: Statt aus einem „Netzwerk der Netzwerke“ wird es aus einer „Cloud von Clouds“ bestehen.

Die im US-Blog [High Scalability](#) zusammengefasste Diskussion basiert auf der Annahme, dass sich unabhängig voneinander existierende Cloud-Umgebungen verbinden wollen – und dass sie künftig nahtlos zusammenarbeiten sollen.

Dies soll so einfach geschehen können wie heute Netzwerke mit dem Internet verknüpft werden können. Die dazu benötigte Technologie bezeichnen die Experten als „Intercloud“: eine verwobene, internationale Cloud aus Cloud-Angeboten.



Cisco-Intercloud: Entwurf fürs Internet der Zukunft.

Business IT Buzz Blog

Prakash Kannoth

Private Cloud , Public Cloud and Inter-Cloud



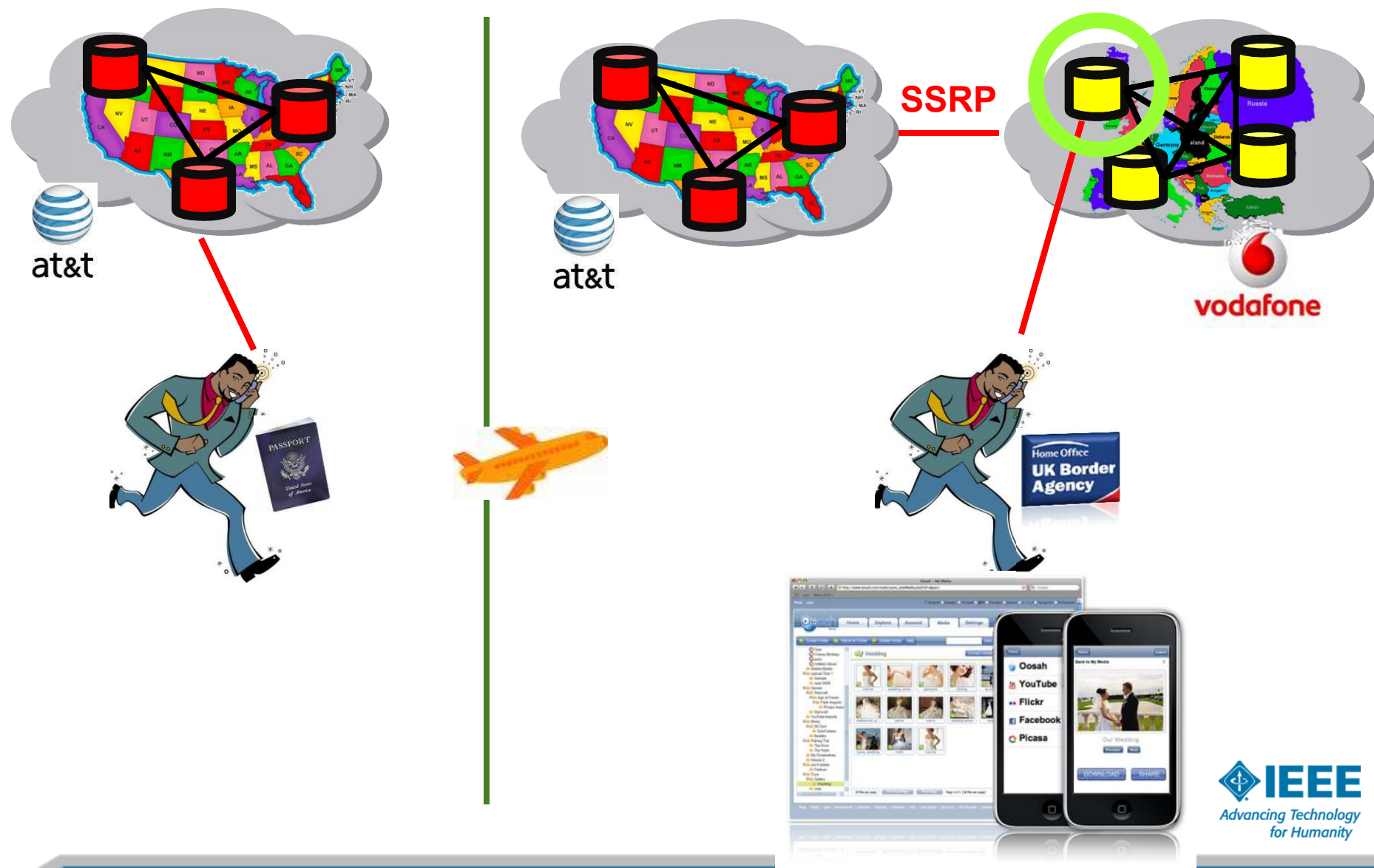
By Prakash Kannoth on April 16, 2009 3:05 PM 2 0 Vote 0 Votes

Lately, my big question for IT professionals is: do you really care about private, public or Inter-Cloud right now? I'm sure you understand what private and public clouds are, so what is Inter-Cloud? Inter-Cloud is a new term coined by Cisco and it's defined by Cisco as "Bringing Cloud Providers together and allowing them to inter connect each other; this creates a Inter-Cloud." Here is a [link](#) to a Cisco video about this vision recorded in December 2008. Recently Cisco started promoting this term and Inter-Cloud Vision to bloggers, analysts and around last December and early January this year. If you are following [David Smith's blog](#) at Gartner you must have noticed an interesting blog conversation between David and James Heubart. To really understand Cisco's vision you have to read this comment posted by James

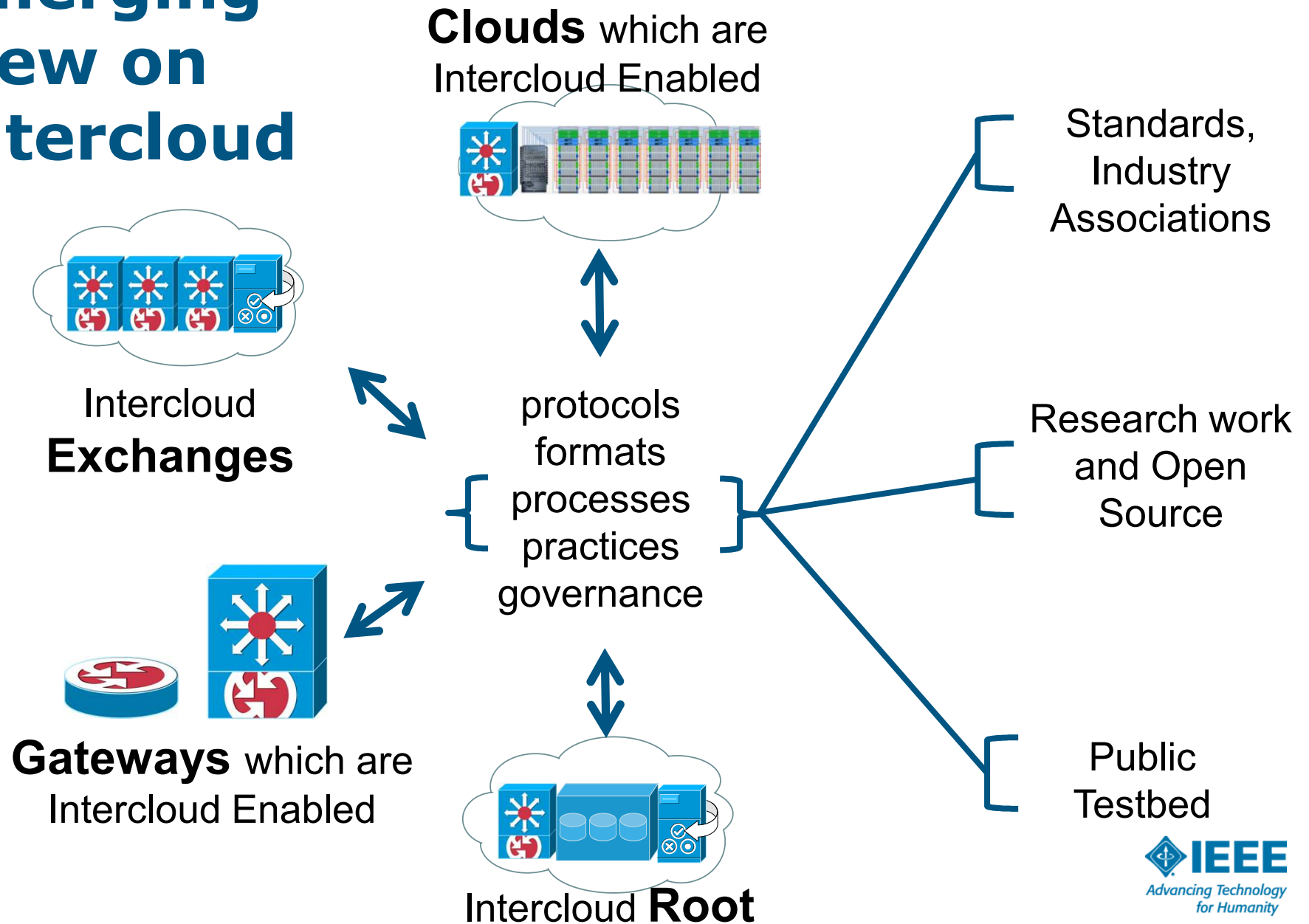
Now is a good time to start

- **No other group is working on Cloud to Cloud Interoperability and Federation**
 - Not like a Clearinghouse or Marketplace for purchasing VM's, which accessed through the usual user API once you purchase them
 - Not like a Cloud Gateway system where specialized equipment and/or software on both sides gives you a vendor specific "hybrid cloud"
 - Think like the Internet: Routing Protocols, Autonomous Systems, Peering and Exchange – Transparent and only Cloud to Cloud
- **This area requires protocols, directory service, registration authority, trust authority, and governance coordination**
- **It should be done in coordination with a live test bed effort and generating open source**

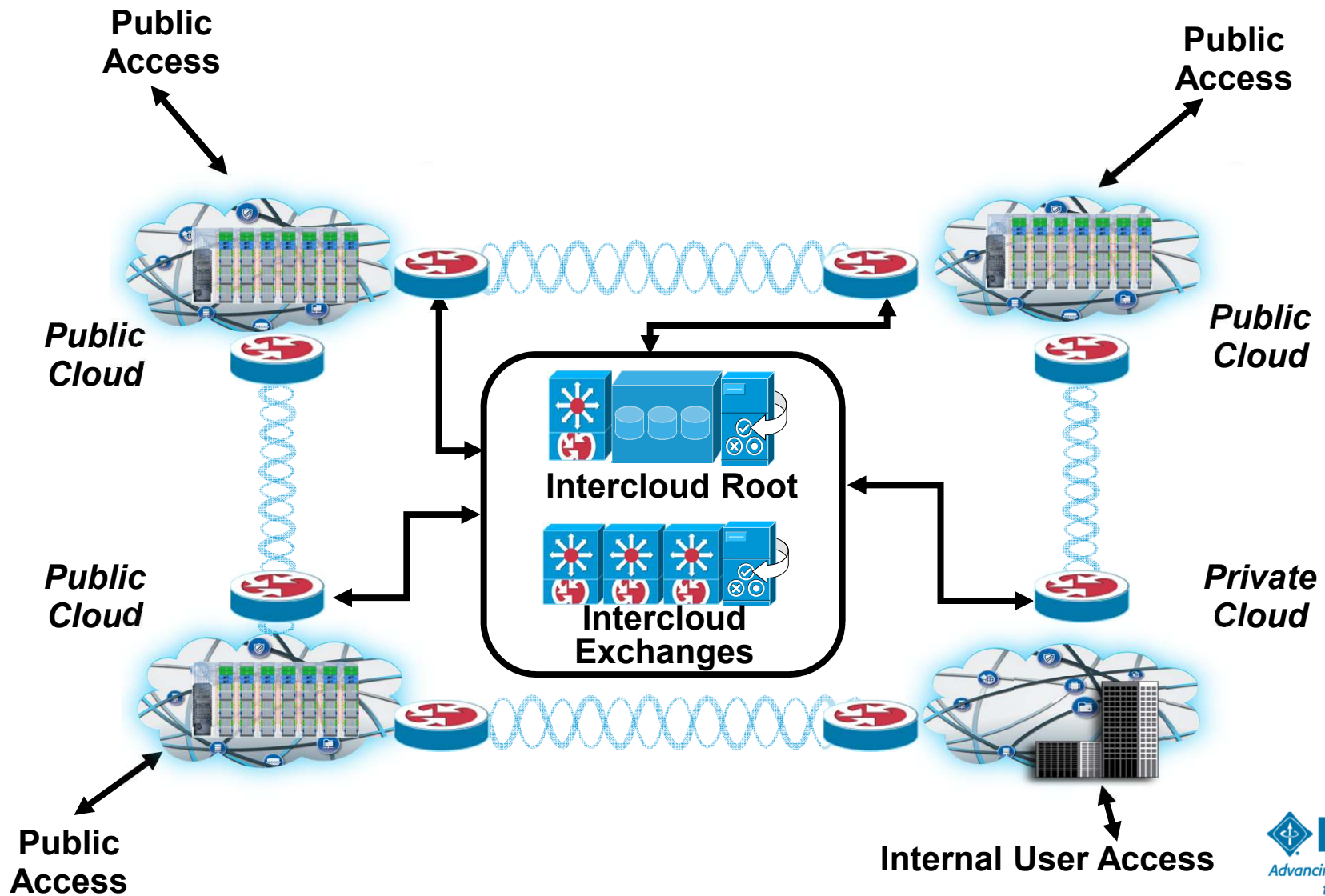
An Intercloud Use Case – Storage Roaming



Emerging View on Intercloud



Reference Network Intercloud Topology



Research Community is approaching workable solutions, lots of good work to build on

Using XMPP as a transport in Intercloud Protocols

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Abstract

Cloud Computing is a term applied to large, hosted datacenters, usually geographically distributed, which offer various computational services on a "utility" basis. Most typically the configuration and provisioning of these datacenters, as far as the services for the subscribers go, is highly automated, to the point of the service being delivered within seconds of the subscriber request. Additionally, the datacenters typically use hypervisor based virtualization as a technique to deliver these services. The concept of a cloud operated by one service provider or enterprise interconnecting with a clouds operated by another is a powerful idea. So far that is limited to use cases where code running on one cloud explicitly references a service on another cloud. There is no implicit and transparent interoperability. This interoperability should be more than cloud to cloud. It should embody 1-to-many and many-to-many models. Working groups have proposed building a layered set of protocols to solve this interoperability challenge called "Intercloud Protocols". Point to Point protocols such as HTTP are not suitable beyond 1-to-1 models; therefore the discussions around many-to-many mechanisms have been proposed, including XMPP. This paper investigates and details the use of XMPP in Intercloud protocols and concludes that logically it is a perfectly suited choice.

1. Introduction

Cloud Computing has emerged recently as a label for a particular type of one or more datacenters, most often, multiple. For the purposes of this paper, we define Cloud Computing as a logical single datacenter, which:

1. May be hosted by anyone, an enterprise, a service provider, or a government.
2. Implement a pool of computing resources and services which are shared amongst subscribers.
3. Charge for resources and services using an "as used" metered and/or capacity based model.

disks, network segments, etc) they are actually virtual implementations of those on an underlying physical infrastructure which the subscriber never sees.

7. The physical infrastructure changes rarely. The virtually delivered resources and services are changing constantly.
8. Resources and services may be of a physical metaphor (servers, disks, network segments, etc) or they may be of an abstract metaphor (blob storage functions, message queue functions, email functions, multicast functions, all of which are accessed by running of code or script to a set of APIs for these

Blueprint for the Intercloud – Protocols and Formats for Cloud Computing Interop

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Abstract

Cloud Computing is a term applied to large, hosted datacenters, usually geographically distributed, which offer various computational services on a "utility" basis. Most typically the configuration and provisioning of these datacenters, as far as the services for the subscribers go, is highly automated, to the point of the service being delivered within seconds of the subscriber request. Additionally, the datacenters typically use hypervisor based virtualization as a technique to deliver these services. The concept of a cloud operated by one service provider or enterprise interconnecting with a clouds operated by another is a powerful idea. So far that is limited to use cases where code running on one cloud explicitly references a service on another cloud. There is no implicit and transparent interoperability. This interoperability should be more than cloud to cloud. It should embody 1-to-many and many-to-many models. Working groups have proposed building a layered set of protocols to solve this interoperability challenge called "Intercloud Protocols". Point to Point protocols such as HTTP are not suitable beyond 1-to-1 models; therefore the discussions around many-to-many mechanisms have been proposed, including XMPP. This paper investigates and details the use of XMPP in Intercloud protocols and concludes that logically it is a perfectly suited choice.

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The First International Workshop on Cloud Computing Interoperability and Services (InterCloud 2010)

<http://intercloud.cloudcom.org>

Organized in cooperation with the Cloud Computing Association

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In conjunction with
The 6th International Wireless Communications and Mobile Computing Conference (IWCMC)

June 28 - July 2, 2010
Le CENTRE DE CONGRÈS de CAEN
Caen, Normandy, France

Submission Deadline: February 15, 2010

SCOPE AND OBJECTIVES

"Cloud" is a common metaphor for an Internet accessible infrastructure, hiding most of the implementation details of the system from users. Cloud computing delivers IT-related capabilities as a service over the Internet, allowing users to access and use the services from their own devices (laptops, tablets, etc.).

The Second International Workshop on Cloud Computing Interoperability and Services (InterCloud 2011)

Call for Papers

Organized in cooperation with the Cloud Computing Association

<http://intercloud.cloudcom.org>



As part of
The 2011 International Conference on High Performance Computing & Simulation (HPCS 2011)
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The 7th International Wireless Communications and Mobile Computing Conference (IWCMC 2011)

July 4 - 8, 2011
Istanbul, Turkey

Submission Deadline: January 11, 2011

InterCloud: Utility-Oriented Federation of Cloud Computing Environments for Scaling of Application Services

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Abstract

Cloud computing providers have setup several data centers at different geographical locations over the Internet in order to optimally serve needs of their customers around the world. However, existing systems do not support mechanisms and policies for dynamically coordinating load distribution among different Cloud-based data centers in order to determine optimal location for hosting application services to achieve reasonable QoS levels. Further, the Cloud computing providers are unable to predict geographic distribution of users and coordination must happen automatically, in response to changes in the load. To creation of federated Cloud computing res just-in-time, opportunistic, and scalable consistently achieving QoS targets under ts conditions. The overall goal is to create a ts dynamic expansion or contraction of nd database) for handling sudden variations

challenges, and architectural elements of ion of Cloud computing environments. The ports scaling of applications across multiple t approach by constructing a set of rigorous a CloudSim toolkit. The results demonstrate odal has immense potential as it offers rds to response time and cost saving under

in to ICOMP'10 - The 10th International Conference on Internet Computing, Las Vegas, NV Jul 12-15 2010
ILDCOMP'10 - The 10th World Congress in Computer Science, Computer Engineering, and Applied Computing
Chair: David Bernstein. Keywords: "Cloud Computing", "Intercloud", "Semantic Web", "RDF", "Ontology"

Semantic Web Ontology for Intercloud Directories and Exchanges

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Abstract

cloud operated by one is interconnecting with a cloud. For that is the running on one cl use on another cloud transparent interop should be more than clo 1-to-many and many-to have proposed building c a this interoperability ch

As a result, the interoperability is distributed in a manner

2009 10th International Symposium on Pervasive Systems, Algorithms, and Networks

Determining Service Trustworthiness in Intercloud Computing Environments

Jemal Abaway
Deakin University
School of Information Technology
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ment of applications and scientific repair resources from multiple distributed along the federation of autonomous Clouds structure environments. As the scope of computing enlarges to ubiquitous and sing, there will be a need to assess and overviews of the cloud computing enties, r presents a fully distributed framework that s parties determine the trustworthiness of untrusted entities.

Cloud computing, Grid computing, reputation,

GICTF White Paper

systems track i and increasing th we have lead to an sing platforms use f cloud computi ing resources and anywhere via the distributed comp applications, they have use comman we refer to Grid-b computing when weple, Amazon, 3 is to be deploie provisioning of v use cloud computa Cloud (EC2) [1] on Amazon's infu storage and network using clouds are s science of other c use and service ab to the logical i is for the purpo a, managing etc.) sing,

IEEE
2008.151

Use Cases and Functional Requirements for Inter-Cloud Computing

provisioning in inter-cloud computing environments. In Section 3, the architecture of the Inter-cloud computing and the proposed trust framework models are discussed. We discuss the representation of reputation and how the reputation is built. We also discuss how reputation is updated as well as how the ratings of others are considered and integrated. In Section 4,



We will post all the various Intercloud Research papers on the P2302 site

Registration and Trust Authorities Exist to work with

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IEEE Registration Authority

Registration is the assignment of unambiguous names to objects in a assignment available to interested parties.

The IEEE Registration Authority was formed in 1986 to register Organizational Identifiers (OUI) at the initiative of the P802 (LAN/MAN) standards group recognized by [ISO/IEC](#) as the authorized Registration Authority for the world-wide.

Since that time, the activities of the Registration Authority have continued to expand to include:

- Organizationally Unique Identifiers (OUI)
- OUI-36
- Individual Address Blocks (IAB)
- EtherType Fields
- Manufacturer ID
- Logical Link Control (LLC)
- Standard Group MAC Addresses
- Unique Registration Numbers (URN)
- IEEE Template/TDL Items
- PSID
- IEEE 802.16 Operator ID



The International Grid Trust Federation

The international community is deploying large scale distributed computing grids on a production scale, across organisations, across countries, and across continents, for the advancement of science and engineering. In shaping this common grid infrastructure, many of these grids are relying on common practices, policies and procedures to reliably identify grid subscribers and resources.

The International Grid Trust Federation (IGTF) is a body to establish common policies and guidelines between its Policy Management Authorities (PMAs) members and to ensure compliance to this Federation Document amongst the participating PMAs. The IGTF does not provide identity assertions but instead ensures that within the scope of the [IGTF charter](#) the assertions issued by accredited authorities of any of its member PMAs meet or exceed an authentication profile relevant to the accredited authority.

Functions and the Trust Anchor Distribution

The IGTF maintains a list of trust anchors, root certificates and related meta-information for all the accredited authorities, i.e., those that meet or exceed the criteria mentioned in the *Authentication Profiles*. The Distribution contains Certificate Revocation List (CRL) locations, contact information, and signing policies.

- [Download the latest update of the Common Distribution](#)
- [Download the Distribution Tools and the fetch-crl utility](#)

Constituency



The IGTF constituency consists of our three member PMAs: the [APGridPMA](#) covering Asia and the Pacific, the [EUGridPMA](#) covering Europe, the Middle East and Africa, and [The Americas Grid PMA](#) covering Latin America, the Caribbean and North America. All registered members in each regional PMA are also members of the IGTF. These include identity providers, CAs, and their major Relying Parties, such as the international Grid Deployment and Infrastructure projects.

Each member PMA holds regular meetings and manages a (closed) email list for discussion. The open IGTF meetings are held at the Open Grid Forum's regular meetings. You can get in contact with the IGTF through your Regional PMA.

News

The latest IGTF trust anchor distribution is always available from the PMA web sites: [EUGridPMA](#) and [APGridPMA](#). Please refer to the [README](#) and [CHANGES](#) files for information about the distribution and its use.

Discussion/Actions

- **Need everyone to get up to speed on the various papers and projects that have been done**
- **There is remarkable agreement across today's researchers on top level architecture and topology**
- **A functional overview describing the basic transport protocol, trust architecture, and functions of each element would be the first work**
 - Conversational protocol (eg, XMPP. or maybe SIP)
 - Root functions including certificate authority, name system, semantic resource directory, etc
 - Exchanges, including optimized constraint based resource matching, auditing, etc
 - P2P Root and Exchange scalability architecture
 - Gateway implementations for a variety of Cloud types
- **Then, protocols and format specifications**
- **Coordination of Test Bed and Open Source**

THANK YOU

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