OGF Network Services Interface

An open standard for dynamic circuit service interoperability

Dynamic circuit services have been recently introduced by many R&E networks. The Open Grid Forum Network Services Interfaces working group (OGF NSI-WG) has been working to define an open interface standard to make such services interoperable among networks. Currently, the NSI-WG is working to finalize a Connection Service document that describes both a service architecture and a protocol for end-to-end circuit provisioning. Additional services, such as a Topology Service, are being proposed as extensions to the NSI interface.

Background

Over the last decade, R&E networks around the world have begun delivering dynamic circuit services directly to applications which require bandwidth and service quality guarantees that cannot be easily provided by conventional best-effort IP networks. To effectively deploy dynamic circuit services, providers require automated management systems that can dynamically provision circuits based on user requests. This is in contrast to the manual process of managing circuits which is often the method practiced today.

The OGF NSI-WG, which was formed in 2008, has been working on the standardization of an interface to request such a circuit. The scope of the interface effort includes not only a user-to-network provider interface but also a provider-to-provider interface.

AIST, KDDI R&D Laboratories, NTT, and the National Institute of Information and Communications Technology (NICT) have been collaborating on the G-lambda project since 2005. This project resulted in the definition of an interface for dynamically allocating both network and distributed resources such as compute and storage.

Key features of NSI

In the proposed architecture of the NSI, each provider’s network is managed by a Network Service Agent (NSA). The NSI is the service interface between NSAs. An NSA can take on the role of a requester, a provider, or both. Multiple NSAs form a recursive framework of requesters and providers. Requests can be propagated through this framework of NSAs using a tree or chain workflow. In the NSI Connection Service, a circuit end point is designated with a Service Termination Point (STP) identifier. STPs are conceptual entities, and by combining the concepts of NSAs and STPs, a mapping between a “service topology” and an abstract representation of multi-layer physical topology can be realized.

Using the NSI Connection Service (CS), the reservation request for an end-to-end connection is shown in Figure 1. The NSI-CS supports the concept of both an auto-start and manual-start. In either case, an explicit provisioning message is required. The behavior of auto-start or manual-start is dependent correspondingly on whether the provisioning message is received before or after the start time of the reservation.

Current status and future plans

As of September 2011, the NSI-CS protocol v1.0 beta was formalized, and interoperability demonstrated at GLIF2011 where seven organizations from all over the world participated in the “plugfest” (protocol interoperability testing). Since then, the protocol has undergone minor changes to support the SC11 demonstration.

After SC11, the NSI-WG plans to release v1.1 of the connection service specification as an official OGF document.

In addition, issues including topology, security (authentication and authorization), service definitions, and fault processing are being discussed. It is planned to have a v2.0 specification that should includes these features published in early 2012.



Fig.1 NSI architecture and a reservation made on the connection service.