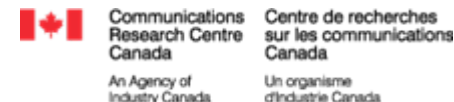


UCLPv1.5 for HEAnet

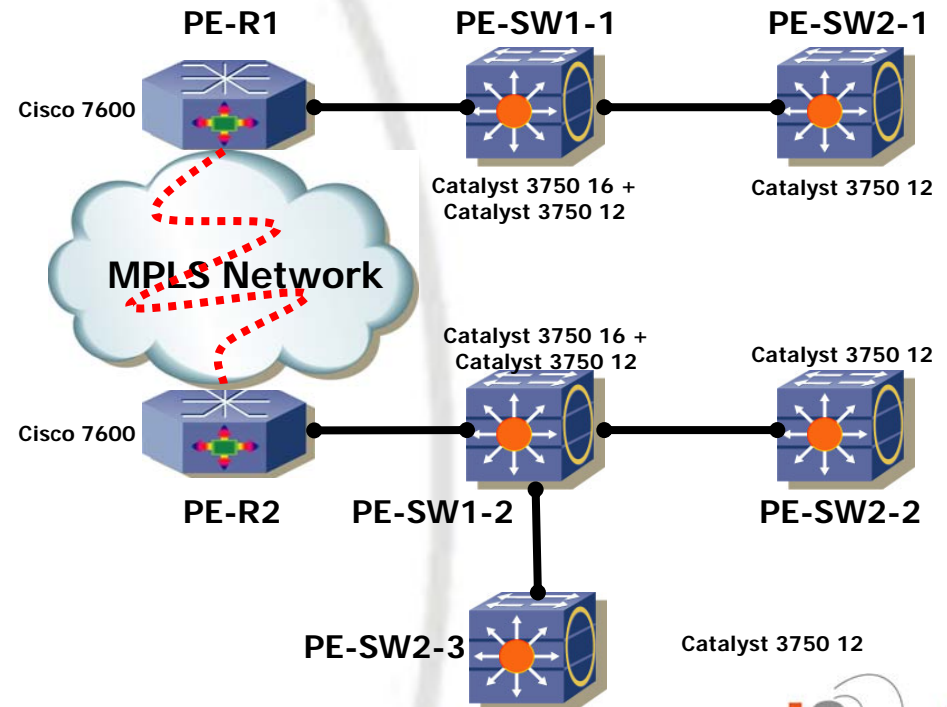
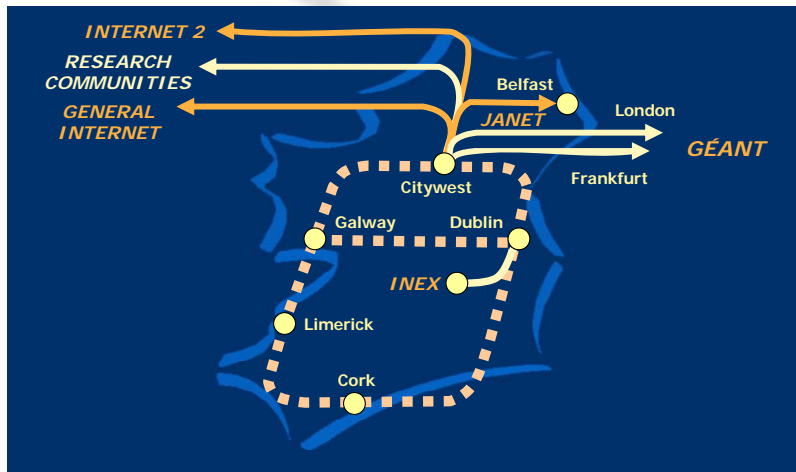
Overview

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UCLP-HEAnet Introduction

- Main goal: To adapt UCLPv1.5 system for HEAnet's network
- Create an UCLP release compatible with HEAnet's network elements and architecture
- Build ethernet point to point circuits across a 760x L2 MPLS VPN enabled network and a switched ethernet 3750 network



UCLP-HEAnet Introduction



- **Partners**

- **Cisco Systems**

Contribution: Has donated to i2cat Foundation a set of devices that emulate the 10 Gbit/s HEAnet's network

- 3 Cisco Catalyst 3750G-12S
 - 12 GE ports
- 2 Cisco Catalyst 3750G-16TD
 - 16 GE ports & 1 10GE CX4 port
- 2 Cisco 7604 Routers
 - 2 10GE CX4 ports

Cisco has also provided E-DI software, support and 2 servers for E-DI.

- **Tecsidel and i2CAT**

Contribution: Have financed great part of the human resources.

- **HEAnet**

Contribution: Provide evaluation, feedback and testbed facilities.



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What is UCLP?

- **UCLP** stands for User Controlled LightPath

Keep in mind that UCLP is evolving into a broader concept than only lightpaths.

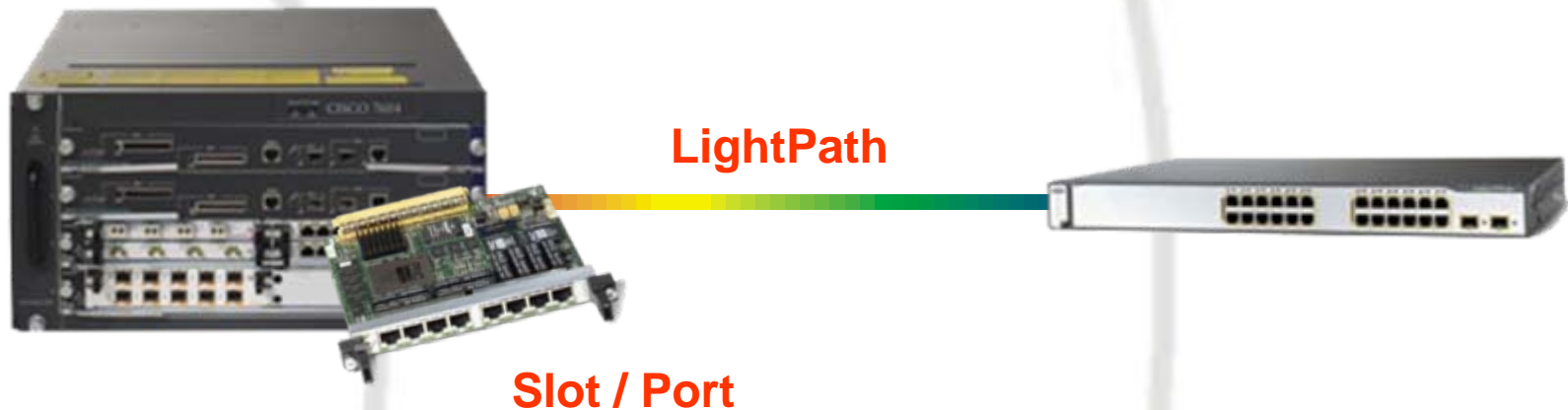
- As Bill St. Arnaud (senior director of Research Networks, CANARIE) says:

'UCLP can be very simply thought of as a configuration and partition manager that exposes each lightpath in a physical network and each network element associated with a lightpath as an 'object' or 'service' that can be put under the control of different network users to create their own IP network topologies'.

- This way network operators can make part of their resources available to end users so that they can decide when they want to create/delete end to end connections or change the network topology.

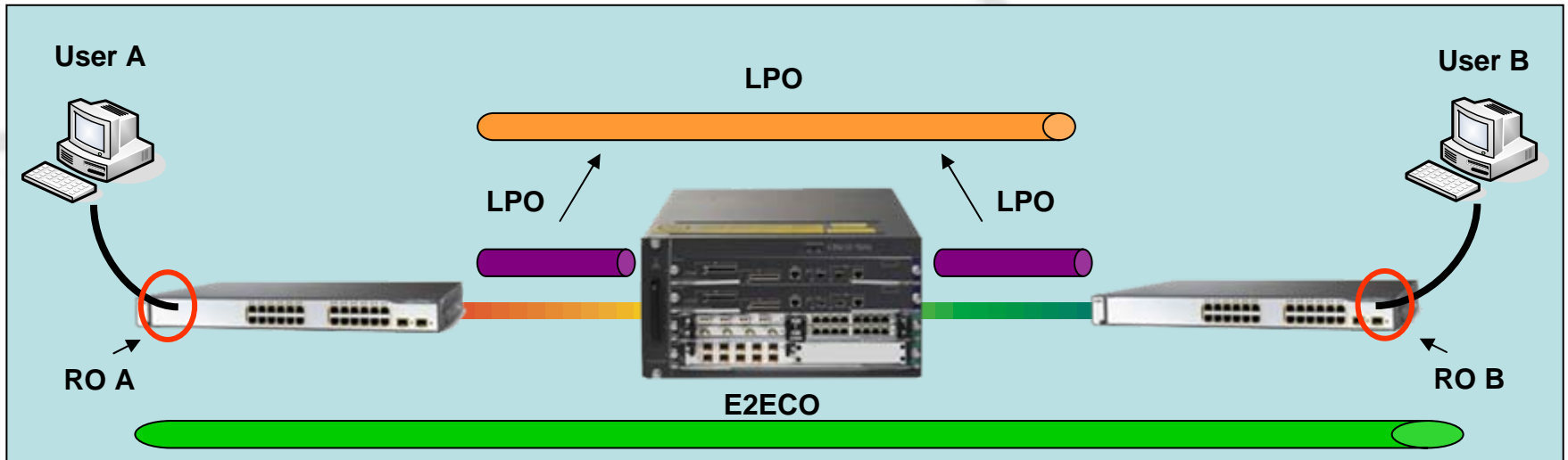
What is UCLP? Definitions (1/2)

- A **LightPath Object (LPO)** is an abstraction of one or more lightpaths (represents a connection between two consecutive nodes).
- A **Resource Object (RO)** is an abstraction of a network interface (Ethernet, SONET/SDH, wavelength).



What is UCLP? Definitions (2/2)

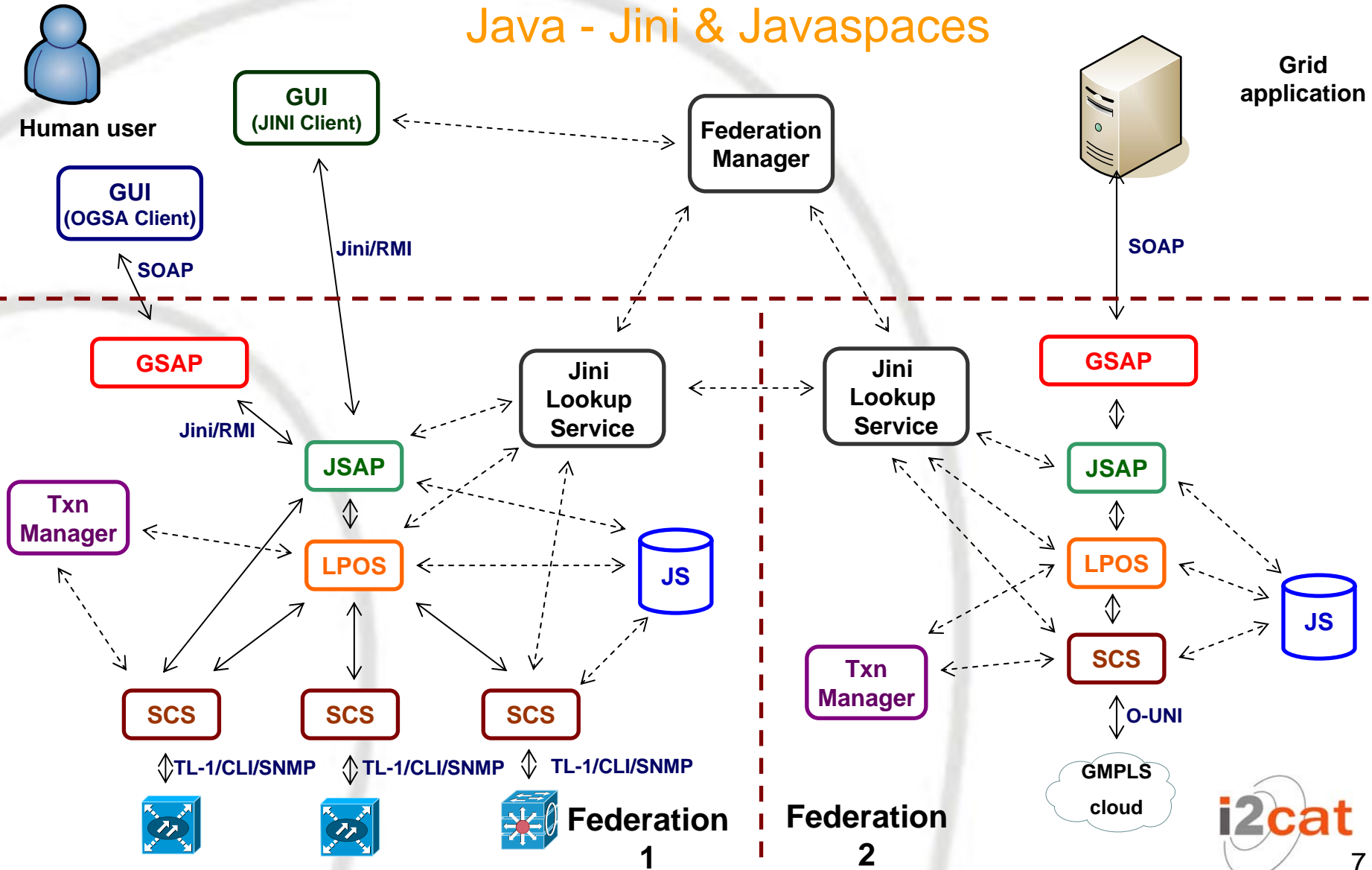
- An **End-to-End Connection Object (E2ECO)** is an abstraction of an e2e connection in the UCLP system.



- A **federation** is an independent management domain that has its own set of UCLP resources and services.

What is UCLP? Software Architecture

Java - Jini & Javaspaces

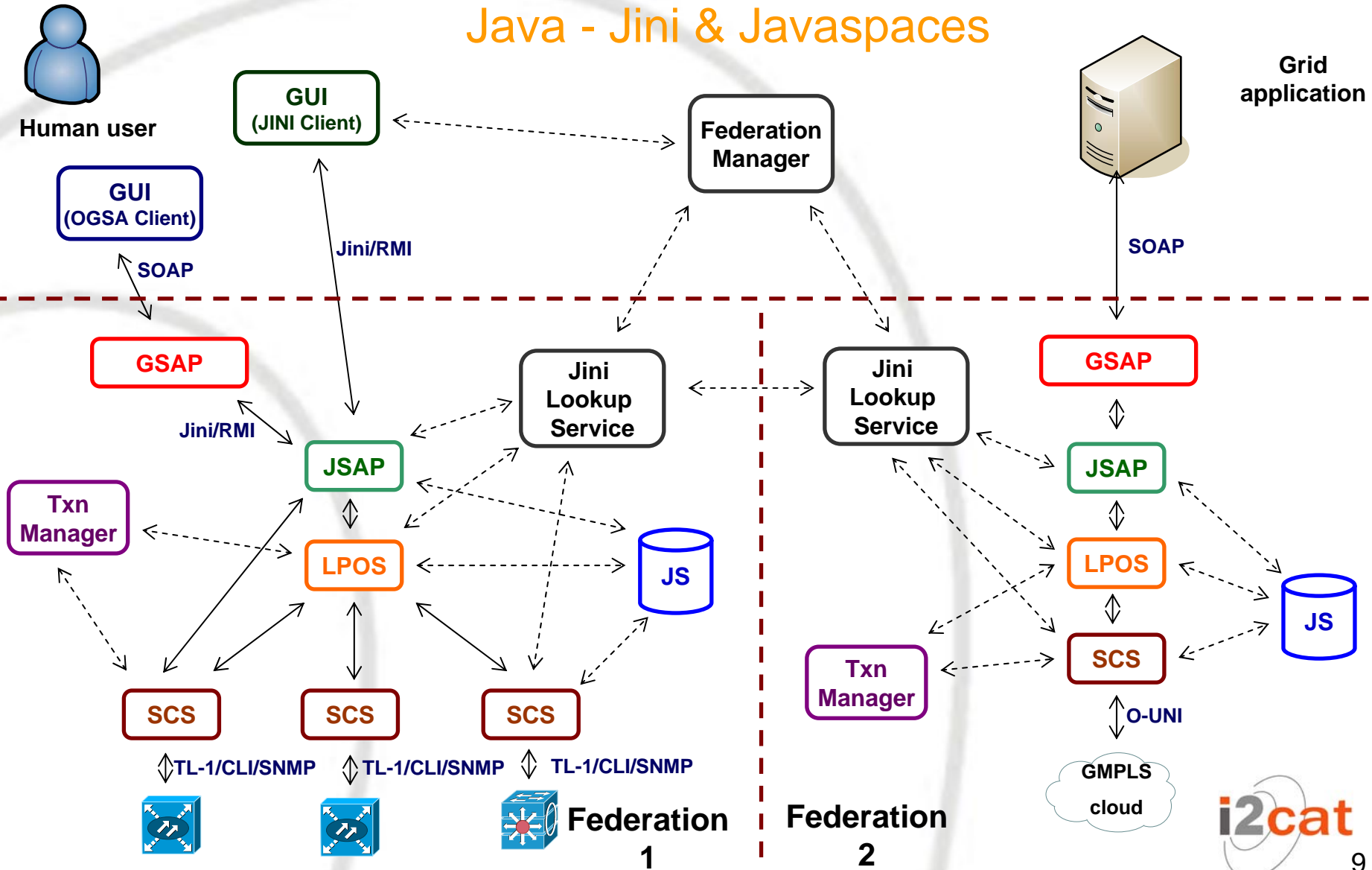


What is UCLP? Software Architecture (1/4)

- **GSAP (Grid Services Access Point)**
 - Is responsible for checking the Grid user's identity and creating service instances for authenticated users.
- **JSAP (Jini Services Access Point)**
 - Manages the user information database.
 - Performs the lightpath discovery routines to discover the available LPOs needed to set up E2ECOs via an Optical Routing Service.
 - Depending on the request from the user, the JSAP will make service calls to the LPOS and SCS to complete the request.

What is UCLP? Software Architecture

Java - Jini & Javaspaces

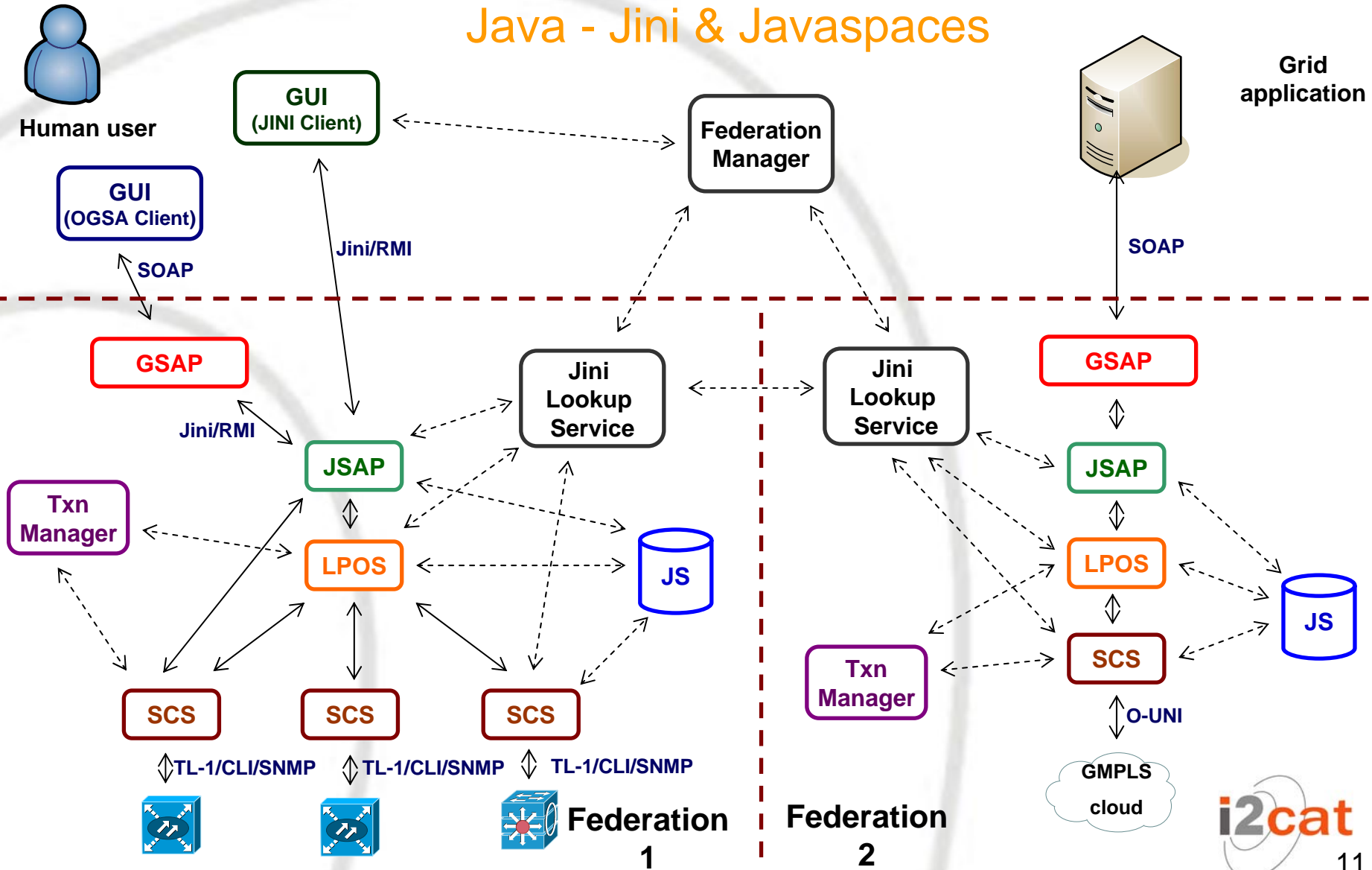


What is UCLP? Software Architecture (2/4)

- **LPOS (LightPath Object Services)**
 - Responsible for managing End-to-End Connections (E2ECOs) and LightPath Objects (LPOs).
 - The LPOS communicates with one or more SCS(s) to setup connections and provision resources on the switch(es).
- **SCS (Switch Communication Services)**
 - Communicates with and controls a switch or AS cloud. The specific details about the underlying switch or cloud remain transparent to the upper Jini services that call the SCS.
 - Manages the Resource Objects (ROs)
 - Waits for alarms at the switch, and notifies the upper layers.

What is UCLP? Software Architecture

Java - Jini & Javaspaces



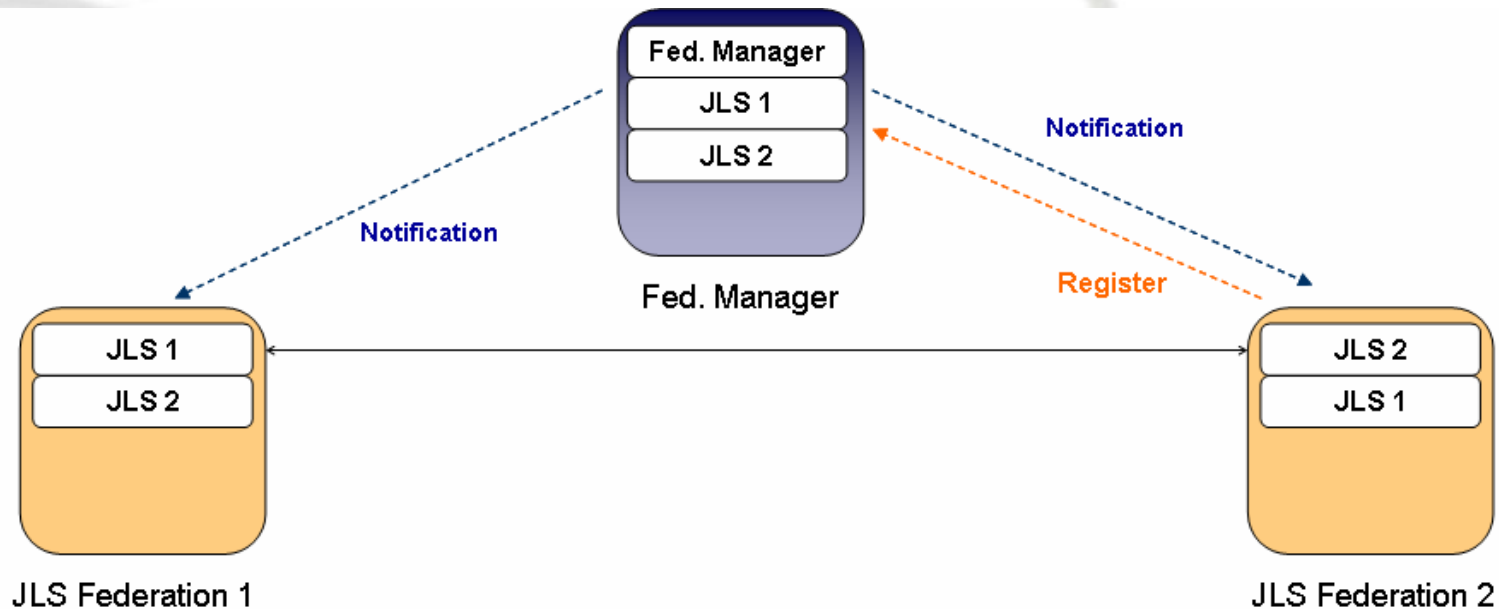
What is UCLP? Software Architecture (3/4)

- **JLS (Jini Lookup Service)**
 - Distributed Jini service registry. Each UCLP Jini services must register with the JLS in the same federation to advertise the existence of its service.
- **JS (JavaSpace)**
 - A JavaSpace is a persistent distributed object store for Java objects. Objects can be read, written and taken from a JavaSpace.
- **Txn Manager (Transaction Manager)**
 - Manages and maintains transactions in the UCLP system.

What is UCLP? Software Architecture (4/4)

- **FedManager (Federation Manager)**

- Federations use their local JLS to communicate with each other.
- Each JLS discovers the location of the other JLSs through a discovery process orchestrated by a (or a group of) master JLS, called the “Federation Manager”.



UCLP-HEAnet Objectives

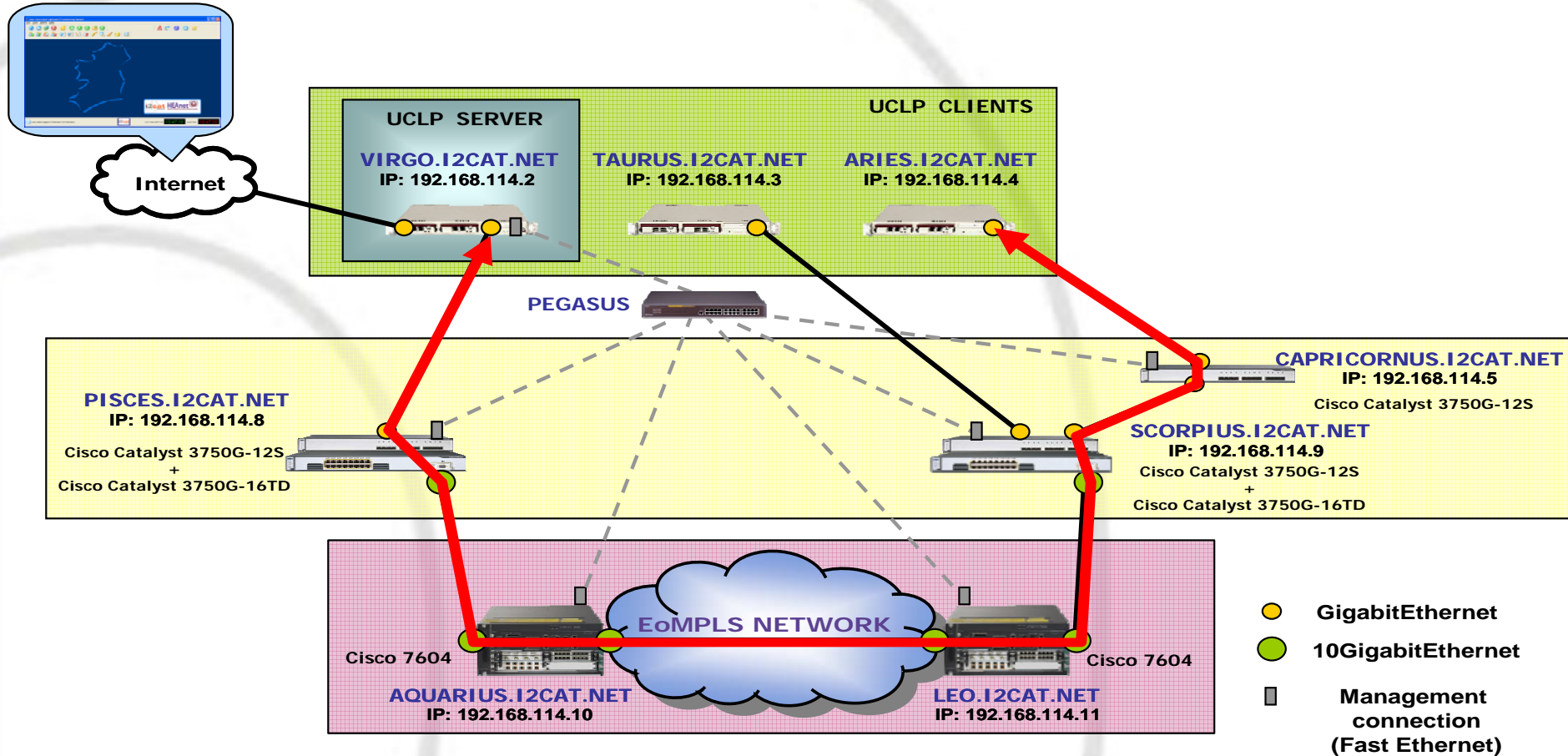
- Get experience with partitioning/virtualisation of the network (see the network as multiple resources, LPO, virtual routers, etc.)
- Get experience to allow HEAnet network clients (Universities and Research Centres) to manage their own connections over the HEAnet's network
- Provide software to establish and control the two key point to point ethernet services which HEAnet is providing:
 - ERS (Ethernet Relay Service) point-to-point VLAN-based ethernet virtual circuit
 - EWS (Ethernet Wire Service) point-to-point port-based transparent ethernet virtual circuit
- The software provides a web-based Java GUI to establish, manage and query these types of connections controlled directly by the user
- Cisco **E-DI (Enhanced-Device Interface)** has been integrated in UCLP in order to manage network devices through an **E-DI Server**
- As a result of this work HEAnet will test this new UCLPv1.5 implementation, compare it with its current provisioning software **and evaluate the possibility of deploying UCLP on their network**

HEAnet's UCLP Supported devices

- **UCLP's adaptation for HEAnet supports the following devices:**
 - Cisco 760x routers
 - Cisco Catalyst 3750 switches (12 1GE ports, 16 1GE ports + 1 10GE port & Catalyst stacks)
 - Devices supported in original UCLPv1.5
- **A new pseudo-device has been implemented to support connections across MPLS networks (MPLSCloud). This pseudo device contains instances of the edge devices of the cloud. The edge ports are represented with the new MPLSRO resource objects.**
- **New devices can be added simply by adding a Java package to the SCS layer**

Test-bed/demo implementation at i2CAT

EWS Connection



UCLP-HEAnet Contact



- For further information please visit

www.i2cat.net

www.uclp.ca

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