

# Work plan and Roadmap

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## JRA2: Network Services Development

### *Task 1: Consolidation of point to point & point to multi point services*

**Abstract** (Taken from latest published GN4-2 DoW document)

This effort is missioned to consolidate the many connections oriented service currently offered by GEANT into a single consolidated, unified service offering. The initial services included are GEANTplus, Bandwidth-on-Demand, GEANT Testbeds Service virtual circuits, and MD-VPN. Other similar connection oriented services such as GEANT Lambdas and Waves may be incorporated into this unified model during GN4-2. The objective is to collapse multiple product service and support silos into a single comprehensive service development function that presents a simplified service model to the user. Fully automated delivery of these services is a key objective. This effort includes: GUI development, hardware configuration protocols, NSI protocol, database design, network topology specification/distribution, path finding, federated AAI, policy support, multi-domain interoperability, etc.

### Work plan

T1 will be mostly infrastructure oriented task in the meaning of that it will cover re-evaluation of all connection services currently offered by GEANT network (there are services which are very similar, or even almost the same as other ones). The special attention will be paid on their implementation in the current GEANT network infrastructure, their delivery and administration process and the level of automatization of it. Results of such effort should be narrowed and simpler service portfolio (i.e. BoD, GEANT plus and GTS circuits are the same thing with different provisioning process. Both can be presented as one common service definition of connection oriented service).

#### CM 06-2017 Update:

The joint effort with T2 has been initiated in order to design and develop E-Line service (internally "The E-Line project"). This E-Line service prototype is intended to be that common connection oriented service mentioned above.

Important part of T1 responsibility will be provisioning of service development laboratory in Prague in cooperation with other tasks personal. The laboratory is now used for the development of Geant Testbed Service (the Software development as well as testing and tweaking up of technologies used in the infrastructures - like NSI for connection provisioning, OpenStack for VM provisioning, OpenFlow HW virtualization techniques and so on ..).

Except the provisioning of laboratory, which will be continuing effort, the planned T1 roadmap will be the following. Initially, at the beginning of phase 2, task 1 will focus on point-to-point Ethernet circuits provisioning. Possibility of integration of GEANT BoD and GTS NSI circuits into one data plane

infrastructure will be examined. Where appropriate, alternations in implementation of the one or another (or both) will be introduced in order to achieve this goal. This could allow to entire GEANT MPLS network to support GTS user's testbed topologies as well as interact with foreign domains more effectively (where NSI will be deployed, the multi domain interaction could be automatized, GTS architecture is ready for that). Next topic to begin with in the first year of GN4-2 will be to improve current GTS VC provisioning.

#### CM 06-2017 Update:

The OpenNSA backend for Junos SPACE has been introduced. OpenNSA has been successfully tested with Geant production network controlled by Junos SPACE. The prototype configuration of Ethernet circuit for Juniper MX routers has been deployed in Junos SPACE as so called Configlets (The parametrized configuration template which can be applied on routers.) which are being applied by OpenNSA. This mechanism is being tested as possible E-Line service provisioning method in Geant network. The fact that OpenNSA is being used in several other organisations except just Geant and is developed by wider community makes it a good candidate to replace AutoBahn as Geant NSI agent.

#### CM 20-2017 Update:

OpenNSA has been deployed at CM 6-2017 over 8 locations in Geant core to support GTSv4. This deployment has been called as CCSv1 deployment as its fully implement a GTS Virtual Circuits as best effort Ethernet over MPLS service with maximum of 10GE capacity.

Task 1 will contribute on the OpenNSA further development. The OpenNSA has a modular south bound interface which makes possible to use it with any possible network equipment used in the network. The E-Line service specification based on NSI and OpenNSA is being specified as general enough to be possible to propose it to other institutions/networks (member NRENs, other research networks around the world) to adopt it and thanks to NSI allow automated provisioning of NSI driven Multi-Domain E-Line service. Task 1 can support the deployment in member NRENs by developing OpenNSA backends for network equipment used by interested NRENs.

#### CM 20-2017 Update:

The first deployment has been done with CESNET. The Multi-Domain peering has been established between CCSv1 deployment in Geant which supports GTSv4 Vcs and CESNET NSI infrastructure which except other also supports CESNET Testbed Service.

Task 1 will investigate and demonstrate the E-Line service with guaranteed QoS in per-flow (understand as per-service; since all frames carried between end points specifying the E-Line service will be considered as members of the same flow from the core network point of view) meaning. This feature is critical for advanced network applications and for support of advanced experiments.

#### CM 12-2017 Update:

The first QoS aware CS implementation has been introduced and demonstrated at SC17. The implementation works with CIENA 6500 platform and allows to dedicate flexible number of timeslots for the OTN connection. It was demonstrated together with GTS deployment over CIENA Testbed (called as

CTS). The implementation for INFINERA is work in progress and will cover the consolidation of the GEANT Geant wave service.

Another area to study in T1 is lambda service. Since it is again just connection service (and in this concrete case also just Ethernet service over “big pipe”), it should be provisioned using same tools and procedures as other circuit service. In order to achieve this, T1 will examine possibilities to provision such circuits using similar service definition as mentioned above. This entire circuit services portfolio should be then presented to users using one common web portal.

CM 06-2017 Update:

Task 1 will investigate a possibility of propose the E-Line services implementation as an Ethernet over OTN in order to provide service which can satisfy the highest QoS demands.

Multipoint services like L2VPN are by their nature connection services as well. Since Point-to-point service can be considered as trivial case of the same type of multi-point service, T1 will investigate and propose possible generalization of connection service definitions to cover multi-point services in order to allow their provisioning using similar integrated tools which will be proposed for point-to-point services.

### Milestones (Deliverables from the DoW)

- |                                   |                                |
|-----------------------------------|--------------------------------|
| • M1 CS v1.0A First Look          | Mth 6 Demonstration            |
| • M2 CS v1.0 In GEANT Production  | Mth 13 Demonstration           |
| • <b>D1 CS v1.0 Service Suite</b> | <b>Mth 18 Software Release</b> |
| • M3 CS v2.0 In GEANT Production  | Mth 25 Demonstration           |
| • <b>D2 CS v2.0 Service Suite</b> | <b>Mth 30 Software Release</b> |

### Roadmap

- **Month 0-8, CM 12-2016:**
  - To study current implementation of BoD service
  - Propose technical aspect of improvements for BoD service
  - To propose solution for GTS VCs over the GEANT core (or [improved] BoD)
  - Prototype solution for OpenNSA
- **Month 9-14, CM 06-2017:**
  - Investigate provisioning of E-Line type service using NSI (ultimate goal – to replace current BoD service)
  - Deliver OpenNSA ready to deploy in Geant to support GTS Vcs, BoD and Geant Plus; **CCSv1**
  - Start effort with T2 on integration of the proposed service into OSS/BSS tools which are being developed in T2 – E-Line
  - Investigate QoS for CCS
- **Month 14-20, CM 12-2017:**
  - Investigate lambda services and their integration into CCS
  - Deliver OpenNSA ready to deploy with OTN circuits support (solution for consolidate Geant wave service); **CCSv2**
  - Implement multi-domain [NSI] operation with first adopter in production
- **Month 21-26, CM 6-2018:**
  - Cooperate with operations and NOC to collect requirements for CCSv3

- Connection service portal – replacement for BoD portal, can be used for implement Geant plus as well
    - Service status check and fail recovery procedures
  - Prepare internal demo of Connection Service GUI
  - Extend multi-domain [NSI] operation
    - NetherLight will be most important MultiDomain This provides general access to a large OXP and will to allow JRA1-T3 to begin testing to reach commercial transport services at NetherLight.
    - CESnet - required for GTS
    - NORDUnet - required for GTS
    - AutoGOLE - Network research community
    - CIENA (North America) - required for GTS
    - StarLight - Chicago OXP
  - Pilot CCS/ELINE
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- **Month 27-30, CM 10-2018:**
  - Inter-domain topology distribution: Resolve SPA topology with NML specifications and distribution standards
  - Rename and rebrand the GEANT Connection Services (“GCS” ?); **CCSv3**
    - Migrate BoD:
      - Integrate and merge BoD service end points into CCS/ELINE service.
      - Migrate existing BoD service instances to CCS/ELINE.
    - Migrate GEANTplus:
      - Integrate and merge GEANTplus service end points into CCS/ELINE domain.
      - Migrate G+ service instances to CCS/ELINE service
  - Prototype Multi-Point CS, also as abstract resource within GVM model