



Amartus

High-caliber Professional Services

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About Amartus

Amartus is an Irish expert Telecom software services company based in Dublin, Ireland and Kraków, Poland. We have been supporting our customers in conceptualization and delivery of high-quality, carrier grade Telecom software products since 2003. Our model of cooperation covers all stages of product / solution development and customization, from conceptualization and requirements collection, through Proof of Concept, planning & strategy to deployment and maintenance.

We provide our expertise in the areas of service orchestration, network management at all levels, OSS / BSS, NMS, EMS and device management, test & measurement, standards & protocols, carrier & service provider environments, and NFV & SDN applications. We belong to MEF and TM Forum, Intel's Network Builders ecosystem and ETSI. As a member of the latter, we were involved in PoC #32 and provided the NFV orchestration.

Examples of commercial solutions developed for our customers include: model-driven architecture, frameworks architecture, Open Source evaluation, test automation frameworks, integration frameworks, applications standardization, OSS / BSS integration, service-oriented architectures, exposing legacy systems via web-based UI or web services, integration of COTS solutions.

Pages 3 & 4 present examples of two complex use cases that we have implemented for our high-profile customers.

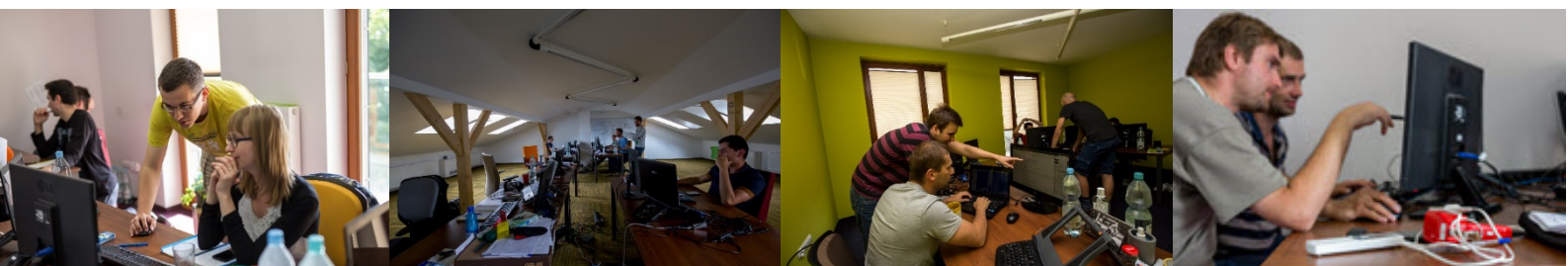
Our Customers

We have supported Communication Service Providers, Network Equipment Vendors and Network Solution Vendors across different projects. Each project has its unique requirements and challenges, and involves different technologies and skill sets, but in all our engagements we have been following the same principles inscribed in our code of conduct:

- We provide to our customers only expert, high-caliber specialists
- We assume low ceremony approach and require minimal project introduction and guidance
- We offer our clients full project transparency and open door policy
- We are deeply committed to long-term cooperation with our customers

Quick Facts

- ✓ Established in 2003 in Ireland
- ✓ Based in Dublin (Ireland) and Kraków (Poland)
- ✓ Group of 50 experienced, passionate, high-caliber professionals
- ✓ **Our People:** Project Managers, Business Analysts, Software Architects, Software Engineers, Network Engineers, QAs, QA Automation Engineers, DevOps
- ✓ **Our Services:** Expert Consulting, Staff Augmentation, New Product Development, Solution Customization, Software Systems Integration, Testing & Test Automation



Use case 1 Multi-vendor integration

Amartus has led many challenging projects that implemented the above principles. We have helped a number of service providers to take advantage from the benefits of standards-based, multi-vendor and open networks and provide their customers with tailored services quicker than their competitors.

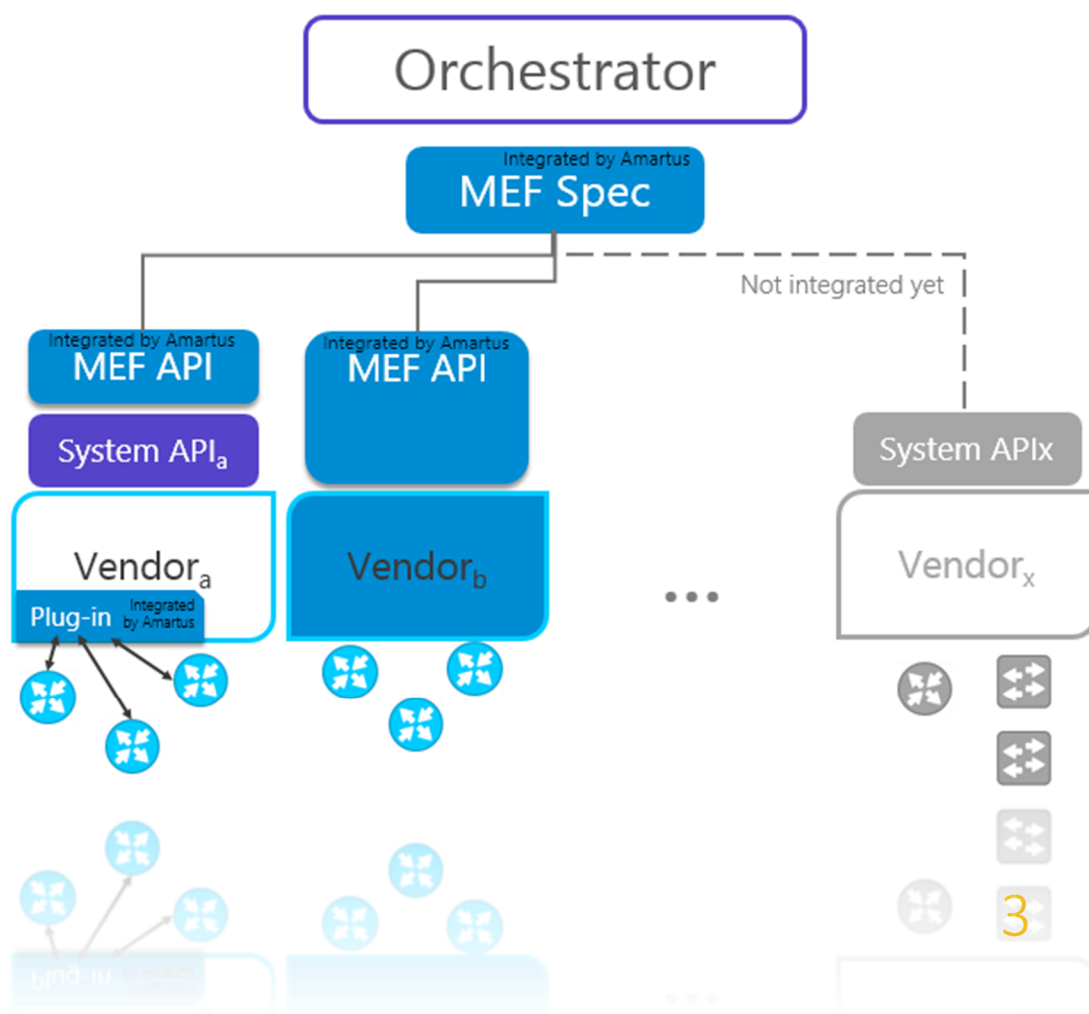
The challenge

One of the use cases involved a leading Tier 1 service provider who was looking to integrate the orchestrator with equipment by different suppliers. The aim was to enable the customer to manage a comprehensive catalogue of MEF services on top of the existing multi-vendor infrastructure.

The solution

Amartus was responsible for integration of equipment by two independent vendors with the provider's MEF orchestrator. To achieve the business goals and allow the provider to facilitate and accelerate service management over the multi-vendor infrastructure, two projects were established:

- *Layer responsible for mediation between the orchestrator and vendors' NMSs.* The layer exposed an interface (REST) compliant with MEF specification delivered by the service provider, and used the southbound message bus of the vendors' system to achieve the business goals. Since part of the required functionality (e.g. QoS) was not supported by the vendor NMSs, Amartus engineers have developed and integrated a plug-in module that covered the functional gap. The plug-in logic communicated directly with the vendors' devices (using devices' CLI).
- *NMS system for MEF services management.* The northbound interface (REST) of the delivered system is fully compliant with the MEF specification provided by the customer. In addition, MTOSI interface is exposed to the orchestrator. The southbound interface of the system is responsible for devices management and configuration (using TL1 and SNMP protocols).



MEF Contribution

Amartus engineers have been involved in the MEF specification refinement. They discussed the MEF interface improvements with the service provider's representatives, and came up with proposals. They also actively collaborated with vendors' engineers to adapt vendors' systems and equipment to the service provider's requirements.

Use case 2 YANG Model-to-model Mediation

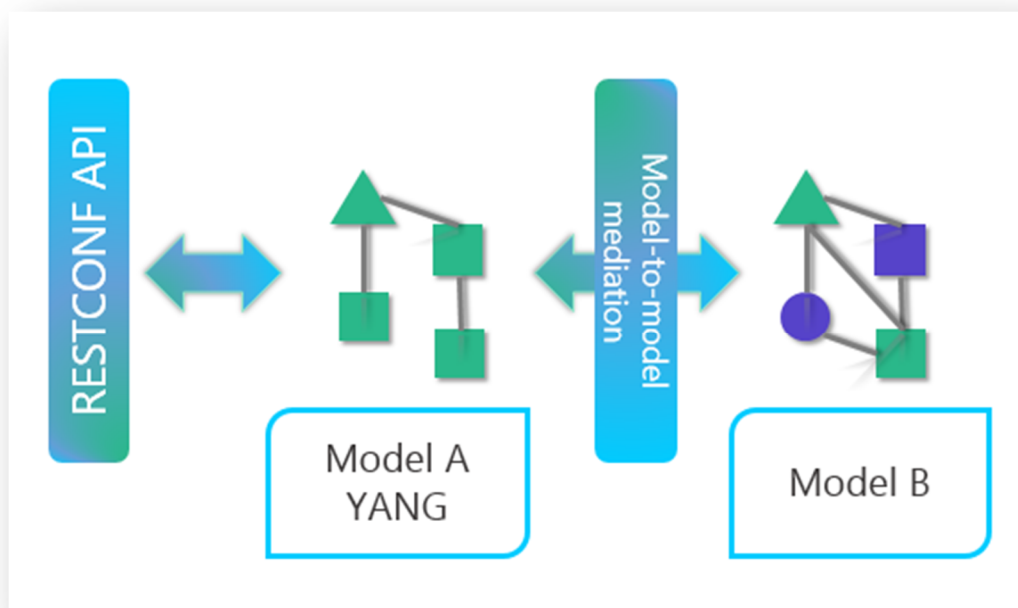
Amartus specializes in delivery of standards-compliant, multi-vendor solutions to network equipment vendors. Thanks to our parallel engagement in service provider projects, we understand CSPs' requirements and can drive solutions for network equipment vendors in the right direction to satisfy them. Here is an example of our project where we were required to provide a solution that would allow the customer to become compliant with YANG/RESTCONF specifications.

The challenge

The aim was to provide the ability to expose part of the customer model via RESTCONF interface. The customer wanted to be able to adjust the exposed model to their needs while leaving the internal model intact, thus the solution had to handle these differences.

The solution

The solution was to build a generator capable of auto-generating the required artefacts from the customer models. One of the generated artefacts was a RESTCONF interface compliant with the protocol specification. Another was a model-to-model mediation module that allows automated bidirectional model transformations. The generator developed by Amartus was integrated with the customer's tool-chain. The generated artefacts were able to automatically integrate with the customer's runtime platform.



Some Successful Engagements



Project: DEVELOPMENT AND CUSTOMIZATION OF STANDARDS-COMPLIANT, CARRIER GRADE ELEMENT AND SERVICE MANAGEMENT SYSTEM FOR MANAGEMENT AND SERVICE PROVISIONING OF PROPRIETARY CARRIER ETHERNET NIDS AND SWITCHES

Amartus customized a dynamic, model-driven and service agnostic platform into a flexible, comprehensive EMS. We extended the framework, conducted MEF standards research and analysis, built all standards-based services and ensured support for the requested technologies, provided the web GUI and a RESTful API, and designed and modelled a comprehensive catalogue of MEF-based Carrier Ethernet 2.0 services. The implementation included delivery of the following EMS modules: Service Discovery, live Service Inventory, comprehensive Service Fault & Performance Management with historical and real-time reporting and graphing capabilities, runtime Service Design & Provisioning, including zero-touch provisioning, Service OAM and geographical topology.

Client: American Tier 3 vendor.

Amartus' role: Product design & definition, project management, architecture & code development, QA, product maintenance & support, product documentation.



Project: DESIGN AND IMPLEMENTATION OF MEF SERVICES IN A COMPREHENSIVE SERVICE FULFILMENT PLATFORM

Provisioning of Carrier Ethernet services compliant with MEF 1.0 and MEF 2.0 standards. Service types: E-Line, E-LAN, E-Access in MPLS core and ITU-T G.8032/ICCP-SM access network environments. Support for different kind of encapsulations: IEEE 802.1q, IEEE 802.1ad, QinQ. EVC tunnelling over MPLS Traffic Engineering network with service continuity protection.

Client: Global Tier 1 vendor.

Amartus' role: Research, design and development. Testing and tests automation. Full ownership (top-down) of all features starting from the UI level down to CLI configlets.



Project: EXTENSION OF EXISTING PROVISIONING ENGINE TO SUPPORT MULTI-VENDOR CAPABILITIES & DELIVERY OF THE END CUSTOMER FEATURES

The first stage of the project included extensions to the existing management communication layer to support multi-vendor devices (Cisco IOS and IOS XR, Juniper). The second phase of the project was to deliver a set of features required by the end customer, including L3 VPN, BGP, static routing, IPv4 / IPv6 addressing, DIA.

Client: Global Tier 1 vendor for top fixed line, mobile telecommunications, and Internet services provider.

Amartus' role: Amartus' team assumed full responsibility for the project execution, including initial analysis and the development process, as well as final-stage testing. The project involved intensive cross-company communication between Amartus, the vendor team and the service provider departments.



Project: DEVELOPMENT AND CUSTOMIZATION TO SPECIFICATION OF L2/L3 SERVICE ORCHESTRATION PLATFORM OVER MULTI-VENDOR ELEMENT MANAGEMENT SYSTEMS

The platform enables complete provisioning of a catalogue of services over devices by multiple vendors (Cisco and Alcatel-Lucent). It uses a comprehensive northbound API to communicate directly with the existing devices and EMSs and to configure L2 (Link Aggregation Control Protocol, VLAN, Bridge, xConnect, VFI Pseudowire Switching) and L3 (route-map, IP VRF, route-target, static route, BFD, BGP) features.

Client: Global Tier 1 vendor for one of the top 5 world's largest Telecom companies.

Amartus' role: Customization to specification, implementation of multi-vendor features, project management and cooperation with a multi-national client team, quality assurance – manual and automated testing (SOAP UI, Java) and development of a test automation framework, project support.



Project: CUSTOMIZATION TO SPECIFICATION OF L2 / L3 VPN FEATURES IN A DISTRIBUTED PLATFORM FOR CARRIER ETHERNET, MPLS VPN AND MPLS TP SERVICE PROVISIONING

The project scope included automatic generation of network devices configurations (including Cisco – IOS and IOS XR, Juniper, Alcatel-Lucent, Huawei) and development of the capabilities allowing update and decommission of device configurations. It also covered configuration and execution of networking tasks – configuration of BGP/MPLS VPNs and implementation of networking functionalities – static routing for IPv4 and IPv6, route policies, multicast, ACLs, QoS, DIA. Additionally, in the course of the project Amartus also created a tool for import of multicast IP pools.

Client: Global Tier 1 vendor for top fixed line, mobile telecommunications, and Internet services provider.

Amartus' role: Customization to specification, design and development of new features, process automation, development of GUI extensions, project management in an international team covering four continents, quality assurance, network engineering.



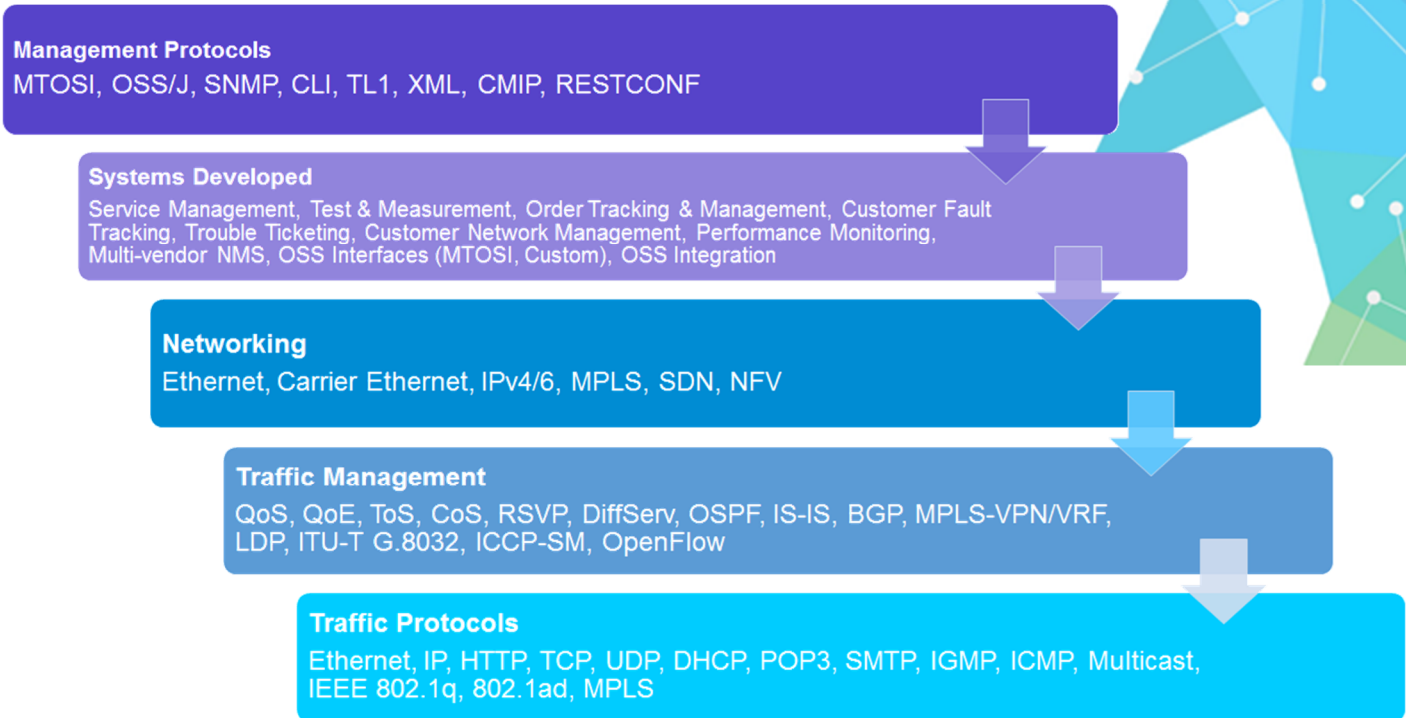
Project: INTEGRATION OF MULTI-VENDOR CAPABILITIES WITH SDN/NFV ORCHESTRATION AND MANAGEMENT SYSTEM

Providing the multi-vendor capabilities for L3 VPN full mesh and hub & spoke services in an SDN / NFV management and orchestration platform. Support for new device types by different vendors, device integration, SNMP discovery, CLI-based configuration, service catalogue design and implementation, RESTconf northbound interface.

Client: Leading global networking and telecommunications company.

Amartus' role: Expert consulting, systems architecture, product design & development, network engineering, project management, QA – manual testing and test automation, product documentation

Amartus Skill Set



Amartus Services

