An Integrated Approach to FTTx Network Lifecycle Management

An Oracle Communications & Synchronoss Joint Solution White Paper
March 2013

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Contents

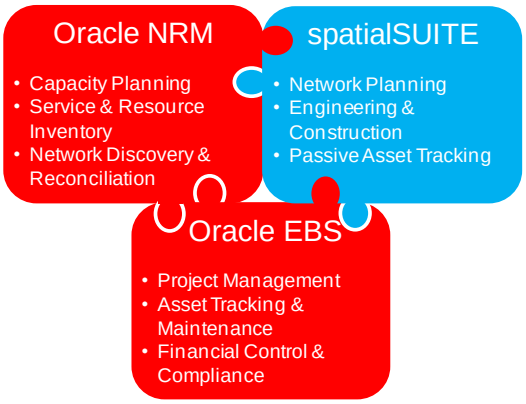
Executive Overview

Fiber optic networks (FTTx) deliver superior broadband speeds to support a wide range of compelling, bandwidth-intensive services including high definition video, interactive gaming, media-rich applications, etc. FTTx networks are composed of three layers: a passive infrastructure layer, an active network layer and a customer service layer each of which is generally supported by its own operational platform often managed by different departments or organizations operating largely in isolation of one another.

Planning, building and operating FTTx networks is a technically complex undertaking that requires robust and flexible Operations Support Systems (OSSs) to manage the FTTx deployment from planning to design to construction and operation of the active network and passive infrastructure layers. However the lack of fully integrated OSS solutions that address these multiple layers of FTTx deployment[1] often results in costly and lengthy network deployment cycles. This is due to inaccurate data, error prone processes and inconsistent network designs that fail to meet customer demands and business asset utilization and RoI targets. These issues also lead to operational silos within today's network operators that further increase CAPEX and OPEX.

Recognizing this, Oracle and Synchronoss have combined each company's complementary capabilities to create a comprehensive, integrated solution to support FTTx network lifecycle management. The integrated solution, which may be deployed incrementally in a phased manner, is designed to:

- Provide functional integration across the network planning, design, build and operations processes to reduce OPEX
- Maximize asset utilization to minimize CAPEX
- Provide full visibility of the network configuration to support day-to-day operations activities and enable more informed business decision making



This paper outlines the capabilities of the integrated Oracle and Synchronoss OSS joint solution, the solution components and their roles supporting the end-to-end business processes together with the business benefits of such an integrated solution for network operators deploying FTTx networks.

The audience includes business and technical owners seeking an integrated FTTx management solution with a focus towards operations and business owners responsible for FTTx network rollouts, including:

- Chief Technology Officer, Head of Network Operations
- Network Planner, Head of Network Capacity Planning and Design
- Chief Financial Officer, Financial Comptroller
- Solution Architects, IT Directors and Chief Architects

An Integrated Solution for FTTx Network Lifecycle Management

Deploying FTTx networks tends to be a very labor intensive undertaking. According to a study from the "Fibre to the Home Council Europe[2]", almost 50% of the CAPEX expenditure on greenfield FTTx environments is for network deployment (such as civil work, cost of labor and training) with the actual cost of materials (cables, network elements, etc.) making up only 10% of the CAPEX expenditure. These significant labor costs result from inaccurate data and error prone processes leading to inconsistent network designs and excessive manual involvement / intervention.

To address this problem, an integrated OSS solution for FTTx Network Lifecycle Management that holistically addresses the passive infrastructure layer, the active network layer and the service layer, is required. Some important requirements for such a comprehensive OSS solution for FTTx networks include:

- Support for the FTTx deployment lifecycle for any FTTx technology including:
  - Point-to-Point (P2P) network
  - Passive Optical Network (PON)
- Increase right-first-time provisioning with accurate data, streamlined interactions and integrations
- Reduce provisioning cycle time with integrations and automations
- Compliance with relevant industry standards including:
  - TM Forum Business Process Framework (eTOM)
  - TM Forum Information Framework (SID)
- Timely and accurate tracking of network assets for financial reporting and compliance
- Flexible deployment options (green-field, brown-field) that leverage existing OSS investments
- Provide an organizational alignment among finance, network planning, operations and engineering

Objectives of the Integrated Joint Solution

To fulfill these requirements, Oracle and Synchronoss both agree that the network inventory should represent how the end-to-end network is planned, deployed and operated across all three layers. The integrated joint solution has been developed in alignment with the TM Forum eTOM standards in which there are two very distinct aspects to managing network-centric business processes:

- Resource planning and engineering – "Service Readiness"
  Includes long-term strategic network planning, capital projects, infrastructure deployment, field engineering and business as usual planning activities including design alternatives and asset utilization.
- Order fulfillment and provisioning – "Service Delivery"
  Includes product and service catalog maintenance, order and provisioning workflow automation, activation and service assurance.

Level 0	Level 1	Level 2	Business Process Functions
Strategy, Infrastructure & Product	Infrastructure Lifecycle Management	Resource Capability Delivery	Long-term strategic network planning, design alternatives, capital projects, infrastructure deployment, asset utilization and field engineering.
Operations	Fulfillment	Resource Provisioning	Product and service catalog maintenance, order and provisioning workflow automation, circuit design and layout creation, activation and service assurance.

Figure 1 – Key TM Forum eTOM business processes supported by the joint solution

To support these TM Forum eTOM business process functions, two distinctive sets of capabilities are required that address the unique requirements of network planning/engineering as well as service provisioning/fulfillment. These capabilities must not only co-exist but also work together in an integrated manner. The integrated joint solution outlined in this white paper supports the "service readiness" business process of the FTTx network that, in turn, enables the effective delivery of customer services over the FTTx network.

FTTx Networks with Multiple Layers

The figure below summarizes the three technology layers typically found in the FTTx network:

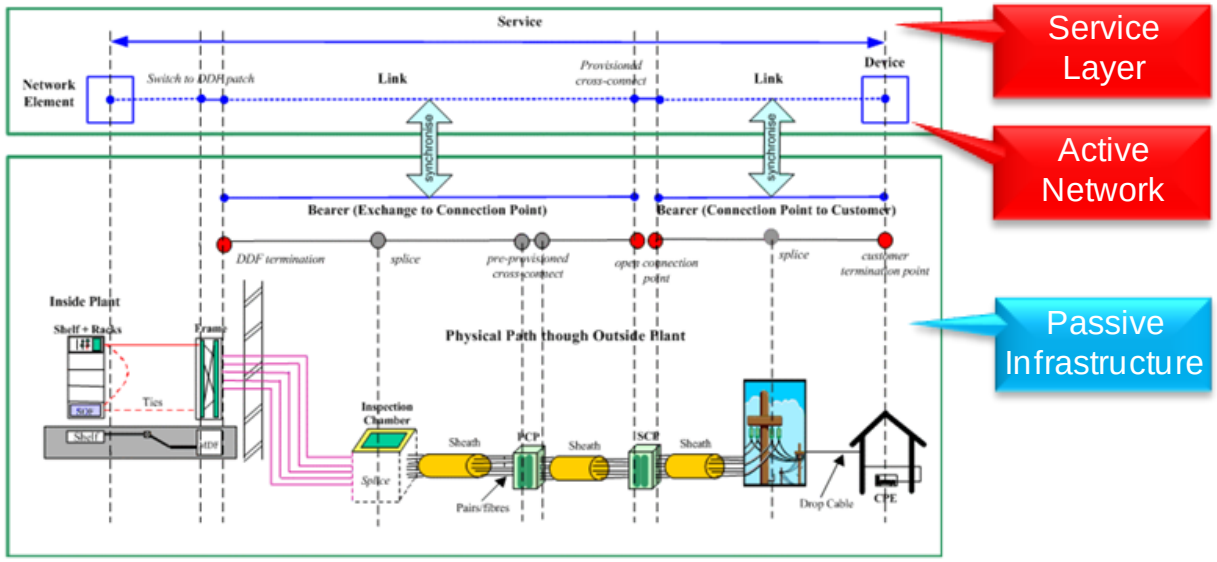
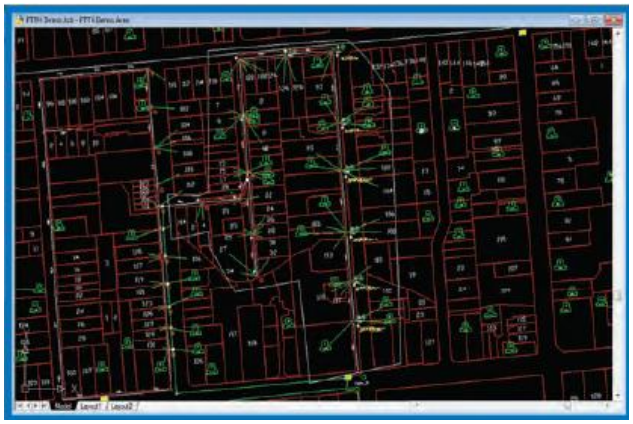


Figure 2 – Providing a "Service Ready" FTTx network with multiple layers

These layers are further described as follows:

Passive Infrastructure

The passive infrastructure layer comprises all the physical elements needed to build the fiber network. This is the layer where the passive network topology is implemented between the Optical Line Terminal (OLT) at a central office and an Optical Network Unit (ONU) at each end user, whether point-to-multipoint or point-to-point including underground, buried and aerial Outside Plant (OSP) equipment bearing structures.

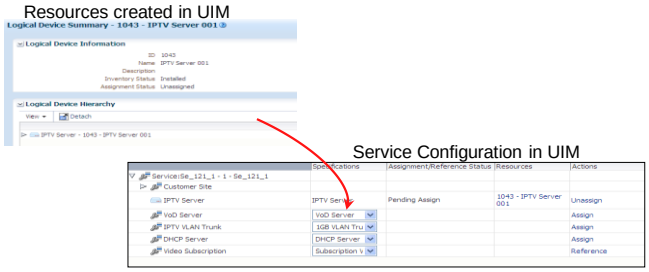


Active Network

The active network layer refers to the electronic network equipment needed to bring the passive infrastructure alive, as well as the operational support systems required to commercialize the fiber connectivity. Inside the Center Office, all fiber connections are connected to the optical distribution frames and terminated at active equipment.

Services Layer

Once the passive and active layers are in place, customer services come into play. This is the layer where the internet connectivity is packaged as a service (or bundled with other services, e.g. IPTV) and provisioned for consumers and businesses.



FTTx Rollout Lifecycle

In order to ensure right-first-time provisioning and to reduce overall cycle times, the joint solution integrates the unique capabilities that each component plays in the entire lifecycle of the network as shown in Table 1. Since FTTx rollout is typically a multi-year project, most service providers will take a phased project approach, but the four stages will all typically be applied to each phase of the project.

TABLE 1. SUPPORTING THE 4 STAGES OF THE FTTX ROLLOUT LIFECYCLE

STAGE	ORACLE NRM	SPATIALSUITE	ORACLE EBS (ERP)
Planning	Network Capacity Planning Active network Planning	Passive Infrastructure Planning Geospatial Planning	
Design	Active Network Build Design	Passive Infrastructure Design	Project Management Asset & Service Procurement
Build & Deploy	Active Network Build & Deployment As-Designed & As-Built Synchronization	Passive Infrastructure Build & Deployment	Asset Management Asset Capitalization
Operation	Service Readiness Service Inventory Management Network Optimization Service Migration and Transformation	Network Maintenance & Operations	Preventative Maintenance Depreciation Calculation Asset Retirement

The Joint Solution Components

The joint solution, outlined below, includes a number of integrated components:

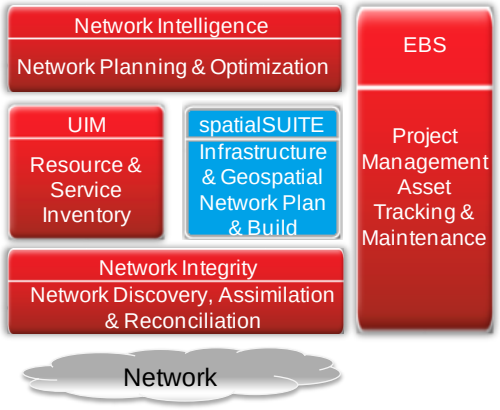


Figure 3 – Joint Solution Architecture

The joint solution includes components from Oracle Communications' Network Resource Management (NRM) solution together with the Synchronoss SpatialSUITE solution to create a holistic FTTx lifecycle management joint solution. The specific components are briefly described in the following sections.

Oracle Communications Network Resource Management (NRM)

Oracle's NRM solution delivers an integrated, product-based solution enabling network operators to plan, build, optimize and transform their communications networks. The integrated solution components and their roles within the solution include:

- **Oracle Communications Unified Inventory Management** (UIM) is an open, standards-based application that provides an intelligent inventory of communications services and resources. Its flexible, extensible architecture enables the rapid design and efficient delivery of all services, including FTTx as well as the management of the logical network resources.
- **Oracle Communications Network Integrity** provides a consolidated application for discovery, assimilation, reconciliation and resolution. An open application, it is also pre-integrated and architecturally-aligned with Oracle UIM ensuring data integrity of any type of network, service, data source EMSs/NMSs and other systems throughout their entire lifecycle.
- **Oracle Communications Network Intelligence** provides end-to-end visibility of network configurations across spatialNET and Oracle UIM together with intelligent, predictive network analytics for agile planning, optimization and network migrations.

Synchronoss SpatialSUITE

Synchronoss' fully integrated suite of applications provides network design, engineering, and asset management functionality to major operators of fiber and cable networks.

- **spatialNET** is the primary network design and management system, used by network engineers to design and manage outside plant communications networks including various forms of FTTx deployments.
- **spatialWEB** is an enterprise web mapping application for delivering communications network asset information more quickly, easily, and cost-effectively across the enterprise. spatialWEB puts communications network intelligence in the hands of fiber splicing specialists, designers, field technicians, construction crews, and operations support technicians to make decisions with the most current data available.
- **spatialOFFLINE** is an enterprise mobile workforce application designed for workers who spend their time in the field constructing, installing and maintaining communications networks.

Oracle E-Business Suite (EBS)

Oracle E-Business Suite (EBS), an Enterprise Resource Planning (ERP) system, is a key component in managing the lifecycle of the network assets. Oracle EBS itself is an integrated software solution that

incorporates the many business functions, including Fixed Asset Management and Asset Tracking, on the financial side of the organization.

- **Oracle Asset Tracking (OAT)** provides a repository for the asset details throughout their entire lifecycle and has direct linkages with Oracle Fixed Assets, Purchasing, Projects and Inventory on the financial side.
- **Oracle Enterprise Asset Management** (eAM) enhances asset utilization with Preventive Maintenance together with OAT. Oracle eAM makes it easy to define engineering specifications to manage an organization's multitude of assets.
- **Oracle Projects** is integrated with Oracle eAM and OAT to provide a complete, seamlessly integrated business solution for project management.

Integrated Solution Operation

To illustrate the operation of the integrated solution for FTTx network implementation, it is important to first understand the high level processes that need to be supported and then the specific steps being performed by the solution components themselves.

Example Process Flows – FTTx Network Implementation

The simplified process for FTTx network implementation together with the areas covered by each solution component is outlined below.

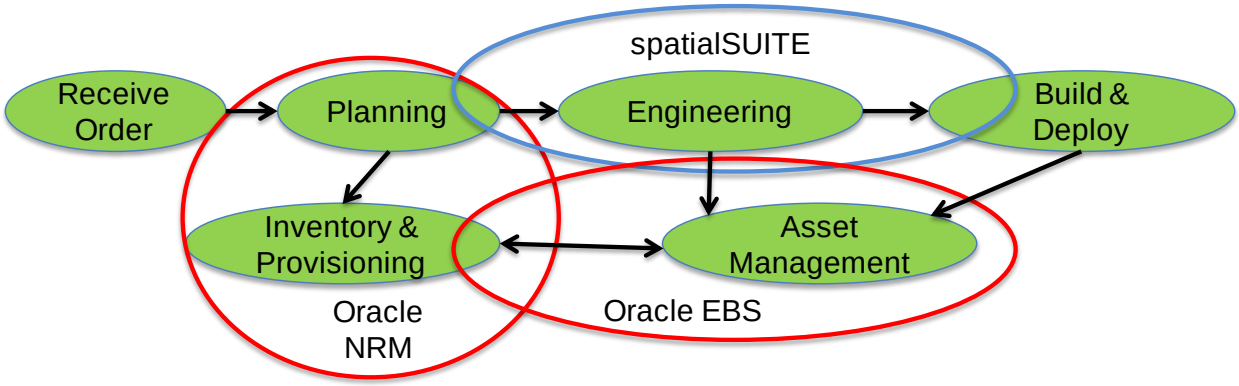


Figure 4 – Illustrative Process Flows for FTTx Network Implementation

Example Process Flow – Metro E Service over a FTTx Network

The simplified process interactions between Oracle UIM (part of the Oracle NRM solution) and Synchronoss spatialSUITE are outlined below (for clarity, steps with additional components such as ERP have been omitted). As can be seen, there is a well defined set of operations in each application with formal integration between them to support the end to end process.

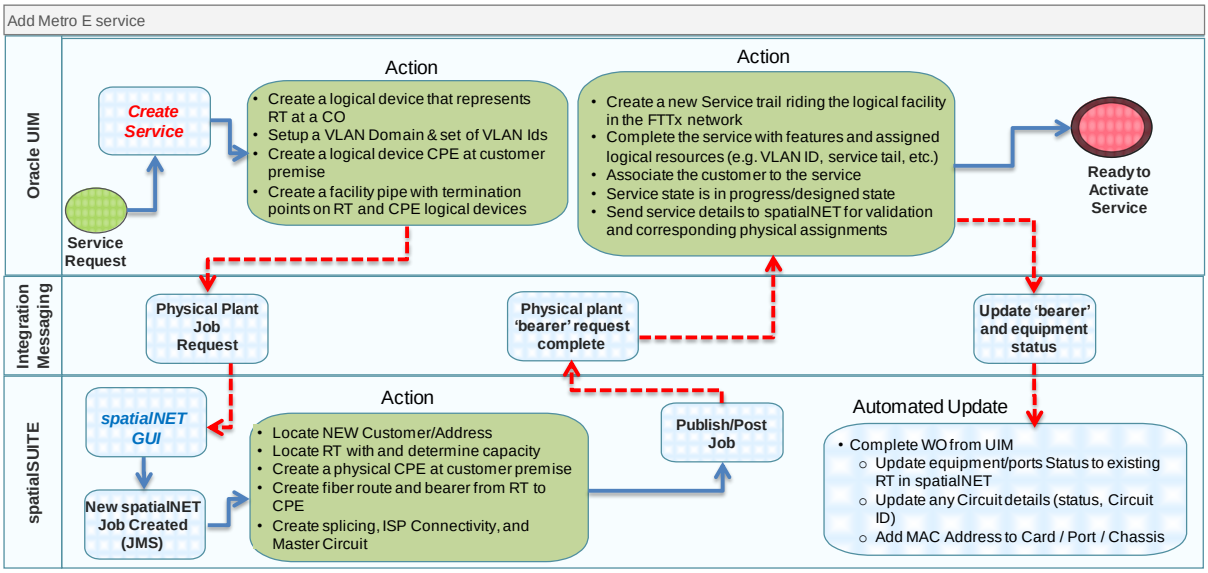


Figure 5 – Example Process Flow to Create Metro Ethernet Service over a FTTx Network

Business Benefits of the Joint OSS Solution

The Oracle and Synchronoss spatialSUITE joint solution delivers significant business benefits – including:

- Increased right-first-time provisioning of P2P and PON FTTx networks with accurate data, streamlined interactions and integrations
- Reduced provisioning cycle times with integrations and automations
- Optimization of costs at every stage in the planning, design, build and operation of the active and passive network layers in a FTTx network
- Rapid impact analysis to identify and minimize downtime for customers affected by a fiber cut
- Higher productivity and faster response times through accurate visualization of the FTTx network
- Faster, more accurate decision-making and improved design flows through efficient sharing of network data
- Tight process and systems integration across network planning, design, build and operations to enable lower OPEX
- Maximized asset utilization to defer or reduce network CAPEX
- Timely and accurate network asset tracking for improved financial reporting and compliance
- Reduced OPEX through optimization and consolidation of leased network capacity

For More Information

For further information about Oracle Communications and Synchronoss solutions for FTTx network management, please email us at comms-oss_ww@oracle.com.

References

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