Cisco's RTOSS service fulfilment turns catalogue synchronisation upside down in preparation for NFV

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Cisco has designed and implemented innovative multi-vendor service fulfilment architecture, Cisco Real-Time OSS (RTOSS), which derives and loads service and resource catalogues from the bottom up rather than the top down. This speeds up the implementation of new physical equipment into the network and improves data quality for communications service providers (CSPs) as they implement new types of service-providing software. The architecture is based on an open standard – Product and Service Assembly (PSA) – and provides benefits today, and will do so to an even greater extent in the coming virtualised world of network function virtualisation (NFV).

Cisco has worked for several years to develop a strong OSS offering to support its equipment sales to CSPs. The Cisco Prime offering has brought Cisco tremendous credibility for operations support – especially in service fulfilment – for Cisco equipment. The active catalogue part of Cisco Prime has brought its offerings into the more complex, real world of multi-vendor equipment, domain-based element management systems and multiple product catalogues. Furthermore, it has an innovative method for catalogue synchronisation, reversing the usual top-down catalogue synchronisation schemes.

Catalogue-driven order orchestration and order management is standard in the industry

Catalogue-driven order management – an order management approach, originally developed by Axiom, has become standard in the industry during the past 10 years. This obviated the need to specify a workflow for each product (a bundle of services) and of each service itself (many of which share many components). In this technique, the task is divided into 'process fragments', each of which is associated with a component. When an order comes in for fulfilment, it usually is processed as shown in Figure 1.

- **Order orchestration.** The order is decomposed into pieces that are then passed to third-party partners or to individual service fulfilment 'stacks' that cover one or more technology areas. The rules for doing this are in the catalogue.

- **Order management.** Each stack takes its piece and decomposes it into its constituent components. Each component to be fulfilled has a process fragment associated with it. The order management system dynamically pieces together the process fragments to create the overall process. This process may be repeated again, in a technology or element management system (EMS) sub-domain.

Figure 1: Order orchestration and order management interaction [Source: Analysys Mason, 2014]
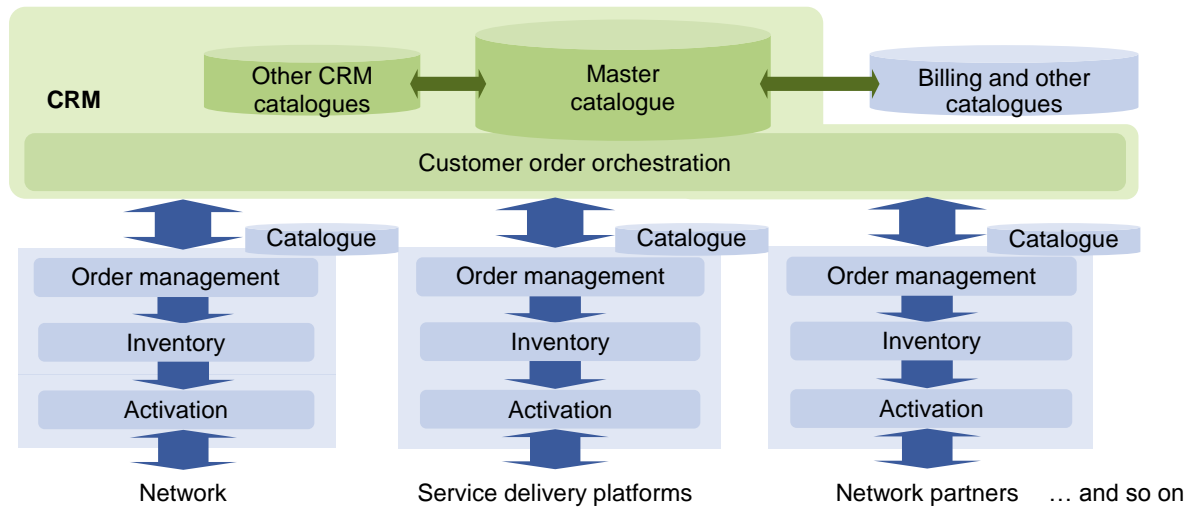

The multiple catalogues need to be synchronised, which is an issue today, but a problem in tomorrow's virtualised world

Catalogues are synchronised manually or semi-manually today. Even if both catalogues use the same data model, the process fragments still need to be synchronised. However, if the catalogues use different data models, a transformation must be done and, often, specific data input manually – usually on the downstream system, which needs more details to accomplish its task. The data model issue has been partly solved by the adoption of the TMForum's SID model and the use of ITIL Master Data Management (MDM) synchronisation techniques and master product and service catalogues. But much manual work remains. This is a minor problem at the moment because new types of network resources are added at a measured pace. However, when network resources have been virtualised, new types of virtualised equipment will be quickly added to the network and new instantiations of the network equipment dynamically created and destroyed, which will add to the complexity. More-dynamic techniques will be required.

Cisco synchronises its 'active catalogue' to the underlying domain catalogues, automating the synchronisation

Cisco acquired the Axiom technology several years ago and embarked on a programme of building a dynamic, 'active' set of catalogues that are synchronised automatically. In a normal architecture, the catalogues are synchronised by a 'bulk push' down from the master catalogue at regular intervals, or the lower-level catalogue is synchronised with the master catalogue via a publish and subscribe interface. However, the domain catalogues in Cisco's system query the individual technology catalogues for their entries – both the inventory and the types of equipment that are present in the network (see Figure 2). The domain catalogues, in turn, provide the information to the overall catalogue – supporting the two layers of decomposition described before. The interfaces are based on the PSA open standard. Some equipment does not conform to the standard so Cisco also offers an integration gateway that can meet the equipment and system's existing APIs, normalising them to the web services PSA standard.

Figure 2: The active hierarchical catalogue synchronisation scheme of the Cisco RTOSS system [Source: Cisco and Analysys Mason, 2014]
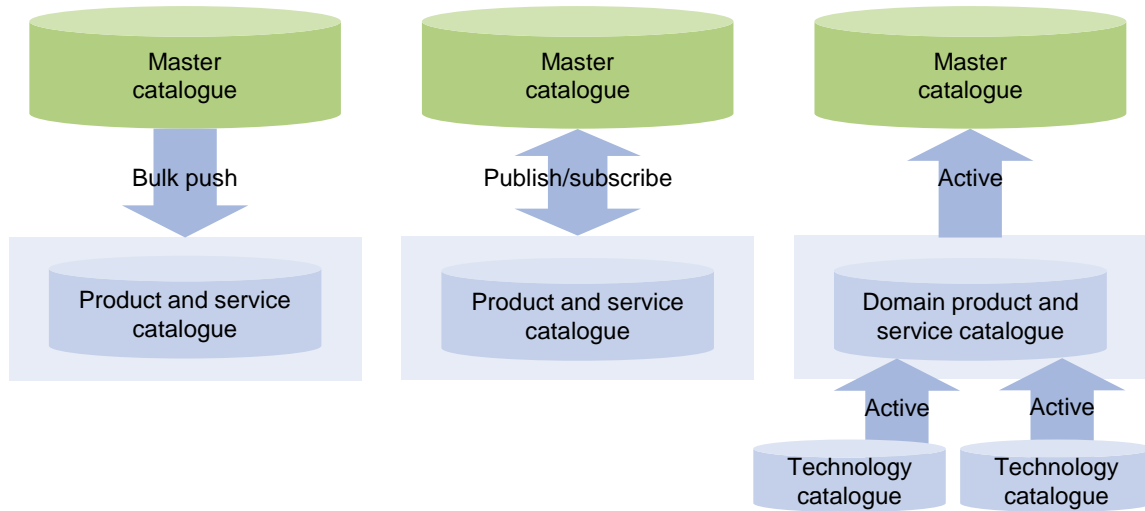
Cisco's approach will provide quicker, more accurate synchronisation of catalogues in the virtualised future

As networks become dynamic (software-driven by NFV and software-defined networking (SDN) technology), the data that the OSSs and BSSs use must become much richer and more real time, covering the capabilities that are available in the different types of network functions and the copies of these network functions dynamically instantiated in the network. Cisco is preparing for that day with a top-down catalogue synchronisation architecture that brings benefits today, but should be even more valuable in the future world of NFV.