Applying Service Engineering Principles to TMN Systems

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INTRODUCTION

Recent work in distributed and telecommunication systems has become increasingly oriented towards applications in a global open market in telecommunications services, as the effects of liberalisation take hold. The areas of network and service management will be essential to competitiveness in this market, however the technologies and system development techniques widely used today (i.e. SNMP and CMIP) were conceived to address the needs of large corporate data networks and monolithic public telecommunication networks. How these technologies and techniques can be applied to management in an open market environment is not currently well defined.

This paper describes some of the work of the RACE II PROJECT PREPARE in its application of ITU-T TMN recommendations to management solutions in an open services environment. In particular it describes the engineering approach taken to developing TMN systems in an attempt to tailor them to such an environment.

CURRENT MANAGEMENT ARCHITECTURES

Before discussing the PREPARE approach for the engineering of management system for the open service market, it is worth examining the different architectures and approaches currently being used in this field.

TMN itself is now well established with detailed MIB specifications standardised for specific and general problems area. This is largely at the network and network element management layers, but increasing, thanks to the efforts of bodies such as the Network Management Forum's SMART group, at the service level also. Though TMN defines a development methodology, it does not address clearly the sort reuse of functional components that will be needed for rapid service development in the open service market. These issues have however been addressed in the underlying assumptions of the Open Distributed Processing standards and the application of the principles they advocate by the Open Management Group, in their CORBA specification, and the by the TINA-Consortium. In this work PREPARE applies some of these principles to TMN inter-domain service management problems.

APPLYING SERVICE ENGINEERING PRINCIPLES TO TMN OSF DESIGN

In the TMN inter-doman prototype developed in PREPARE several service level TMN OSFs manage services offered by different administrative domains. These OSFs required multiple interfaces to support management functionality for internal administrators, for service customers and for co-operative interfaces with other service provider OSFs. It became clear in the design of several such OSFs that though the definition of interfaces "on the wire", e.g. over TMN X interfaces, was well supported by the standard TMN approach, this did not help in integrating the functionality offered by these interfaces into a single OSF. To facilitate this therefore, some techniques were borrowed from the TINA approach to telecommunication service integration. This involved defining not only inter-OSF interfaces, but also the functional components within the OSFs that used these inter-domain interfaces, in terms of interfaces that would allow them to be integrated with other components easily. These latter, intra-domain interfaces were defined as objects, similar to TINA

computational object, which in turn were grouped into building blocks (BB) related to specific functional areas. In line with the light-weight, rapid prototyping approach of PREPARE, a distributed object platform, providing location transparency in a similar way to the TINA Distributed Processing Environment (DPE), was developed in Tcl/Tk. This allowed objects in different building blocks to communicate, as well as providing them with access to a high level CMIP API for use in inter-OSF communication.

The figure 1 shows an example of an OSF constructed in this manner. It depicts the management OSF for a multimedia conferencing (MMC) service. This has application specific building block incorporated for MMC management and for managing a separate Virtual Private Network (VPN) service that provides underlying communications services. In addition the following building blocks were used in common with others OSFs developed in the project:

- *service offering browser* (SOB): offers functionality for browsing the X.500 directory for services to be subscribed to.
- *subscription manager*: offer functionality for managing subscription management information over an X-interface.
- *bill manager*: offers functionality for accessing billing managemnet information over an X-interface
- *graphical user interface (GUIs) co-ordinator:* offer functionality for integrating GUIs related to the different BB into a single operator workstation function.

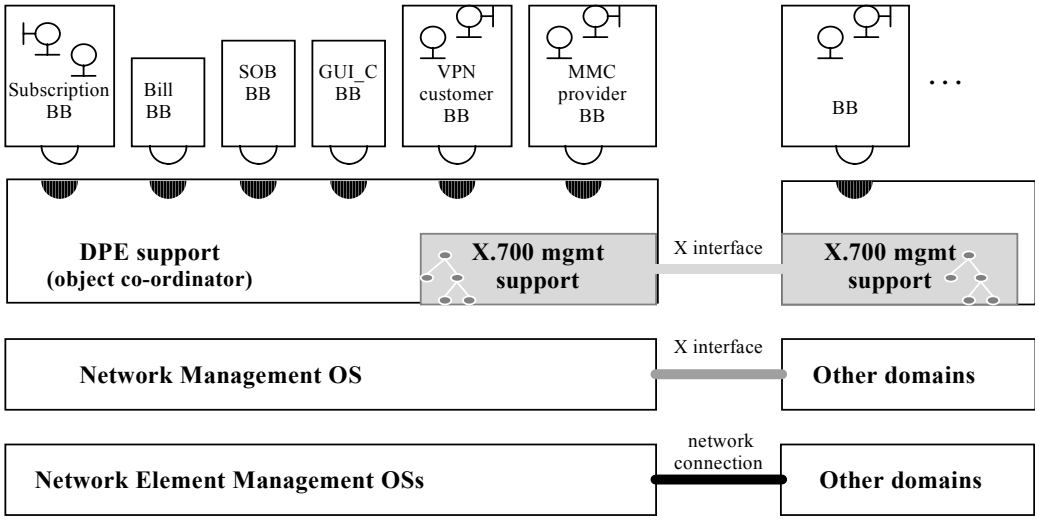

Fig. 1: Building-block based structure for MMC OSF

CONCLUSION

The PREPARE project assembled and demonstrated a complex array of inter-work service level OSF communicating over X-interfaces, in a manner depicting the future application of TMN to the opens service market. However to gain fuller advantage of access to open management interfaces at the service level, and to be able to reuse common OSF functional components, a distributed object-oriented approach to the structure of OSFs was taken. This was found to offer benefits in the integration of multiple management services offered over different X interfaces.

This work is being progressed in the ACTS project PROSPECT, where the integration of CMIP-based and CORBA-based management components is being examined.