THE DESIGN OF DISCOVERY AND RECONCILIATION OF LTE NETWORK

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Abstract—Discovery and Reconciliation of LTE Network describes the web-based discovery and reconciliation tool used to discover and reconcile discrepancies between two entities, in particular, between the network and Adaptive Inventory (AI). It is necessary to keep records of each and every device in network for the company by which it can keep the details about the devices recorded in the network as per the status of presence or failure of that device. Discovery and Reconciliation of LTE Network supports the discovery of physical and logical network assets. The discovered objects are then compared with objects stored in a system, typically the Adaptive Inventory. Discrepancies are identified, along with recommended ways to resolve the discrepancies. This paper provides the overview of system flow of Discovery and Reconciliation of LTE Network and also includes the existing system and the proposed system.

Keywords—Long Term Evolution, Universal Mobile Telecommunication System, Home Subscriber Server, Packet Data Network, Mobility Management Entity.

I. INTRODUCTION

The primary function of Discovery and Reconciliation [1] is to keep the Adaptive Inventory database and a variety of different types of networks in synchronization with one another. Discovery and Reconciliation uses the Adaptive Inventory with the Adaptive Inventory XML Gateway to provide a complete data discovery and reconciliation solution.

It performs the following tasks:
Discovery - It collects data from both logical and physical networks and other sources of discovered data, in real time or as scheduled by the carrier. It provides the data in a normalized format.
Reconciliation - It suggests specific reconciliation actions to resolve these discrepancies, and allows the user to select which objects shall be reconciled – manually or automatically.
Discovery and Reconciliation works with any network equipment. New equipment types can be added quickly as a carrier's network expands. Discovery and Reconciliation can also interact with NMS/EMS (Network Management System/Element Management System) or with any other system that contains network data to upload and transform the network data and limit additional touch-points into the network.

II. PROPOSED SYSTEM

In this system we are providing Range based discovery, Individual discovery & Device based discovery of network elements from which Device Based Discovery is absent in existing system. This will be advantageous if any new device that has been added will get discovered at the time of Range Based Discovery and gets added in the main inventory. This will save lot of time & will improve the efficiency of the system by reducing the efforts of manual entry.
Our system also has options by which the user can perform the selection for updating the database either through automatic update functions or it can be done by user manually after the discovery of network elements.

III. DISCOVERY AND RECONCILIATION ARCHITECTURE

Discovery and Reconciliation is a product that allows customers to integrate their network with an inventory system. Traditionally, the “Discovery and Reconciliation” Product was used to get data from the Network and Reconcile it in Granite inventory. A database is considered a Northbound system for Discovery, the Network is considered a Southbound system [4].

The following are the major components of a Discovery Solution:

Database: Typically Granite is used. Other databases can be connected to Discovery.

Discovery and Reconciliation Product: the main component of a Discovery Solution, its main responsibility is to get the data from the Network and reconcile it in a Database.

ASI: Used to query Granite for the Core Discovery Modules. For custom modules, it is used to query and update Granite.

Gateway: A system used to update Granite. Discovery uses Gateway to update Granite for its Core Modules.

Discovery Designer Studio: A tool that can be used to create custom modules in Discovery.

Connectors – Used by Discovery to connect to Granite and other systems.

Adapters: Used to query the Network and return data to Discovery for reconciliation.

The following figure represents the high level system components Discovery and Reconciliation

Figure 1 Discovery and Reconciliation System Overview
IV. LTE ADAPTER

LTE Adapter consists of 3 sub components LTE NMS Adapter, LTE Equipment Hierarchy Adapter & LTE Logical Adapters.

V. SYSTEM FLOW

The Northbound system for Discovery is the Database. All jobs start with Discovery querying the database and getting information that would aid in executing jobs. The Network is considered the Southbound system for Discovery and communications to the Southbound system is done via Adapter. The following figure depicts a typical system flow for a Discovery job:

The cycle of Discovery from start to updating Granite is called a job. Inside a job, multiple tasks are executed within a job. Once a job is finished, the output of the jobs can be updating the database, publishing a JMS event, both or No Action. Depending on the job type, Discovery might spawn off other jobs to complete the job that was executed.

Components of LTE Adapter is
• LTE NMS Adapter
• LTE Equipment Hierarchy Adapter
• LTE Logical Adapter
LTE NMS Adapter

Following flow shows discovery and reconciliation of LTE top level containers.

LTE Equipment Hierarchy Adapter
Following flow shows discovery and reconciliation of container, shelf, slot, card, port process.

LTE Logical Adapter
Following flow shows discovery and reconciliation of enode b, LTE cells.
VI. SYSTEM COMPONENTS
The Discovery and Reconciliation System contains components that are used to communicate with two systems and reconcile data from one system into another. The major components are:

Discovery Adapters
Discovery Core Modules
Discovery Custom Modules created by DDS.
Reconciliation Rules “Business Rules”

VII. CONCLUSION
In this paper, Discovery system flow is proposed, which overcomes the limitation of previous static method. It will significantly improve the performance. Discovery also helps in keeping track of all the devices in network and performs fault detection and management. When combined with knowledge based search algorithms, its performance could be further improved. In conjunction with Discovery and Reconciliation of LTE Network, adapters are used to communicate with each vendor's Network Element (NEs) or Element Management Systems (EMS). This allows Adaptive Inventory users to query network equipment and synchronize the inventory data with the discovered results.

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