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Development of High Availability Framework for the chassis of Advanced TCA (ATCA) in CDMA Networks

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Abstract— **Advanced Telecommunication Computing Architecture (ATCA) is a high speed chassis based architecture, specifically designed to give telecommunication services. The increasing complexities require more and better validation techniques to check functional correctness of these ATCA systems. The tests are conducted on various blades of ATCA chassis to check reliability, sanity and performance assurance of various high availability software features that are running on it. Each individual blade is a self equipped high speed super computer that provides call and data processing services. The existing validation techniques require the user to login to each blade connected to the chassis and perform the tests individually to validate the high availability software features that are running on it. This process is time consuming and requires a lot of human effort, as the number of tests are increased with the increase in the number of features running on it. This High Availability framework is designed and developed, which is expected to provide a centralized control and monitoring capability over the ATCA chassis that is being validated. It establishes a bridge between the user and ATCA chassis and thus allows the user to simultaneously run tests on multiple blades, collect results and also to store the results for future references.**

Keywords— **ATCA, High Availability, Validation, Reliability**

I. INTRODUCTION

Telecommunication is the transmission of information, over significant distances for the purpose of communication. The telecommunication industry is responsible for radio, television, voice communications, and broadband services. The growth and innovation of the telecom industry has enabled people to communicate across the globe and access endless amounts of information over the internet. Broadband services are becoming faster and easier to access with fiber optic networks and wireless services like WiMax and CDMA.

Mobile Phones have been evolved to serve the needs of today's world. Mobile phones supporting different standards are available in the Market. Network providers should accommodate the different users with different standards by providing them the standard based on the capacity of the phone. The different standards available in market are 1G, 2G, 3G and 4G (evolving) [1].

High availability and reliability are among the most desirable features of control systems in modern telecommunication and other big-scale scientific experiments. One of the recent developments that has influenced this field was the emergence of the Advanced Telecommunications Computing Architecture (ATCA). By making use of ATCA it is possible to meet the requirements for the next generation of "carrier grade" communications equipment. The ATCA specifications incorporates the latest trends in high speed interconnect technologie next-generation processors, and improved Reliability, Availability and Serviceability(RAS)[2].

II. LITERATURE REVIEW

The project is supposed to be hands on for the middleware team to help them find bugs in the high availability software in an efficient way. This section includes details about the domain background and technological background required to understand the need and also to meet the objectives of the proposed system.

A. Previous systems

Technology has made enormous strides in the past five to ten years, adding to the amount of work an average designer must endure. Networks consisted of a basic client/server relationship, one protocol (possibly two), and a few shared applications.

At that time there were many application specific hardware which were specifically designed to serve one particular service as depicted in Figure 1. During that time each system had their own constraints and data speeds. It was difficult for the system designers to keep in mind all the different needs and constraints of every subsystem and to debug them for failures.

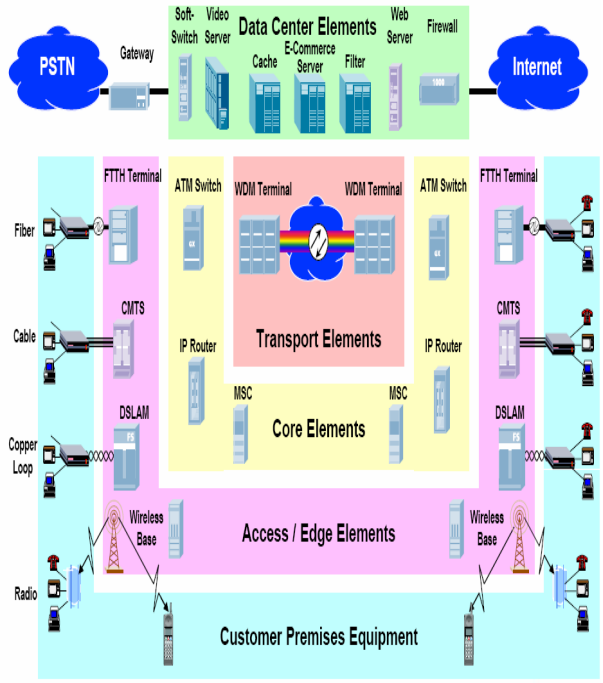

Figure 1. Previous Network Architecture of Telecommunication

B. Existing Systems

During the 1990's the Telecommunications market experienced two extremely favorable market factors of quickly increasing bandwidth requirements combined with fast market growth. In the continuing effort to lower the cost of communications equipment, Telecommunications Equipment Manufacturers (TEMs) are migrating away from proprietary designs toward the use of standards-based designs [3]. Standardization can be implemented at several levels in the system's design while preserving the ability to differentiate through software and services. Standards at the level of physical layer protocols, silicon, blades, chassis mechanical characteristics, power, system management and software have all been leveraged to lower the costs of system design, manufacture, maintenance and application development.

PICMG 3.0 is the foundational specification for systems featuring scalable capacity, five 9's reliability, manageability, high availability, modularity and serviceability. A well thought out standard attracts a multitude of component vendors creating a rich ecosystem of building blocks from which system designers may choose. The network architecture chosen today is as shown in the Figure 2. Competition among vendors and economies of scale in manufacturing cause price reduction to quickly ensue.

The PICMG 3.0 specification for ATCA systems addresses numerous aspects of an open architecture modular platform: mechanical design, shelf management, power distribution, thermal management, and data transport [4].

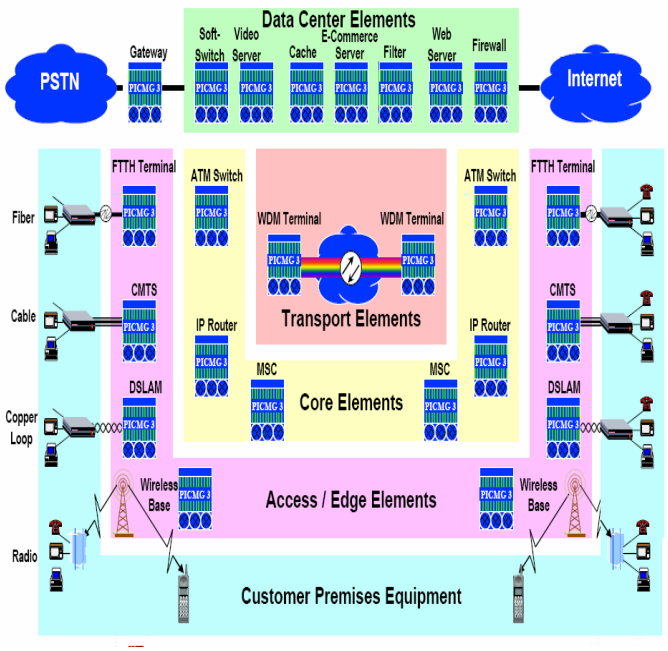

Figure 2. Current Network Architecture of Telecommunication

III. PROPOSED SYSTEM

The proposed system is to develop an a High Availability Framework for the chassis of AdvancedTCA . This infrastructure establishes a bridge between Solaris host server and target ATCA chassis and allows user to assign jobs and validate the system

The Advanced Telecom Computing Architecture (ATCA), describes a high bandwidth, high connectivity, chassis based architecture designed principally to appeal to the telecommunications industry. It supports chassis based architecture as shown in the Figure 3. It supports 14 high

speed blade servers that can be connected together to serve as a single system. It also consists of a shelf manager which monitors the health all node cards that are registered to it. The different blades can be grouped into multiple clusters each providing a specific service. Hence it supports reliable cluster computing.

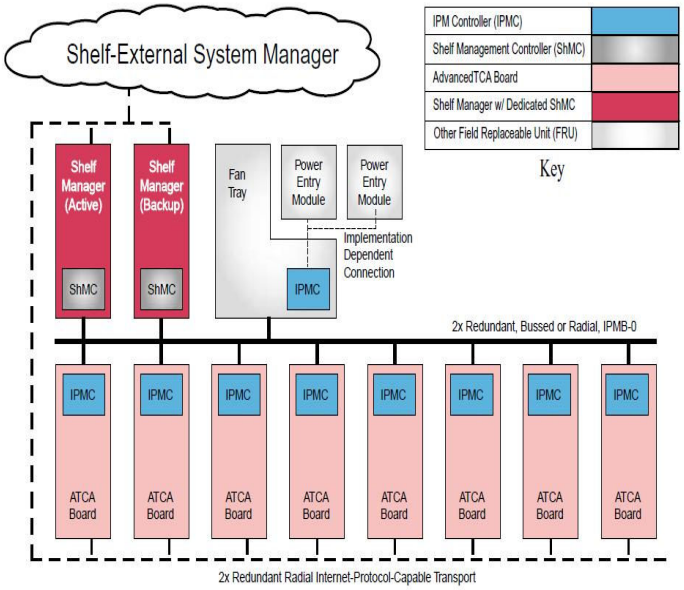

Figure 3. ATCA Hardware Architecture

The proposed system is expected to serve the following:

- The proposed system provides facility to store the execution trace and also the outcome of the results in a repository which serves as a reference for future queries.
- The proposed system allows the user to run multiple jobs in regression mode and collect the overall result of the execution and allows user study the system behavior.
- The proposed system provides extensible meaning that it can be used for future projects with minimal changes by the system administrator.
- The proposed system provides better usability to reduce the effort required by an individual to perform the validation when compared with the existing techniques.

IV. OBJECTIVES AND SCOPE

The purpose of the project is to speed up the verification process of ATCA high availability software features by developing a high availability framework which provides a centralized control over the ATCA system. The framework is a centralized system which establishes a bridge between the user's system and ATCA platform to provide control to the user to assign tasks and collect results. The framework developed is intended to serve as reference architecture for integrating new and enhanced features as required in the future for monitoring and controlling the activities on the ATCA hardware.

The scope of this high availability framework is to minimize the amount of time required to verify and validate the newly deployed ATCA systems, with all its hardware and software related features. It also reduces the total man power required in the process of testing high availability software features.

V. METHODOLOGY

The higher level architecture of the product is described in this section. This overall overview is given by the help of data flow diagrams. The different levels of data flow diagrams are further simplified for the understanding of the processing of the data in general and working of the features and product in particular.

A.Level 0 Data Flow Diagram

The level 0 is the initial level Data Flow Diagram and it provides the context level diagram of High Availability framework .

The High Availability framework provides a user friendly interface for the user to validate the ATCA chassis for its high availability software features. The end user of this infrastructure should have at least minimum knowledge of the ATCA chassis, software and the High Availability framework. It would help them to debug issues if any and fix the problem.

Level 0 Data Flow Diagram for the High Availability framework is as depicted in the Figure 4 below.

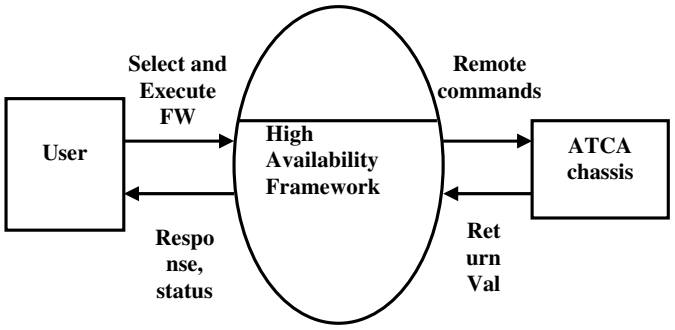

Figure 4 Level 0 DFD

B. Level 1 Data Flow Diagram

The Level 1 Data Flow Diagram gives more information than the level 0 Data Flow Diagram. This DFD elaborates on the processing and flow of data in a much finer detail and traces the flow of data among different components and entities.

The Figure 5, shows the Level 1 Data Flow Diagram of High Availability framework. As shown in the Figure 5, this project involves two major steps:

- Development of High Availability framework.
- Validation of ATCA chassis using the above infrastructure.

Development of High Availability framework involves coding of scripts in Perl and shell languages. These scripts are reviewed and validated for their correctness by executing them on the ATCA chassis. Development of these scripts requires thorough knowledge on ATCA systems and its high availability software. It needs to balance the between difference between processing speeds and response time of host machine and different blades installed on ATCA chassis.

The applications developed must be checked for their consistency by executing them rigorously on the ATCA chassis.

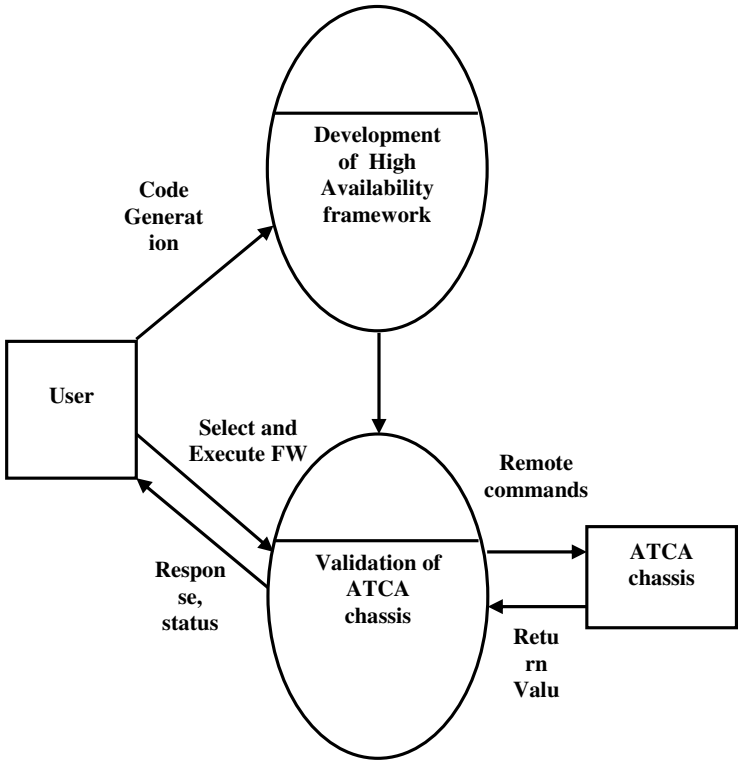

Figure 5. Level 1 DFD of High Availability framework.

VI. CONCLUSION

High Availability framework is a comprehensive system developed for reducing the overhead involved in ATCA chassis validation for high availability software features. The human effort and time spent in validation is significantly reduced with the use of this framework . The framework developed establishes a bridge between the users and multiple ATCA chassis. It allows the users to perform tests and retrieve information from ATCA hardware. This framework architecture also serves as a reference for applications which require similar processing model.

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