Chapter 2

Problem domain

2.1 Introduction

Previous chapter introduced the Hutchison Telecommunication and their problems in brief, aim and objectives and solution for this issue. This chapter is about the domain of Alarm monitoring systems, existing Alarm monitoring systems, and comparison with proposed system.

2.2 Current System

2.2.1 Current issues in Alarm Monitoring

Alarm Monitoring plays a critical role of Site maintenance. Hence it is known as one of the key factors that OMC needs. Uninformed Site failures results lots of blame and loss of money. Hutchison Telecom operates with more than 500 sites with every month 20-30 sites adding, all over the country.

2.2.2 Alarms

Each BTS site generates Alarms which is critical for daily maintenance and operations. Basically they are categorized into 3 groups.

1. BSS equipment failure alarms (responsibility for BSS engineers)
    1. TRx failure (Transceiver) alarms
    2. Cell break alarms
    3. CMM abnormal alarms
    4. Standby CMM abnormal alarms
    5. VSWR alarms
    6. BSC failure alarms
    7. Fan module alarms
    8. BTS Site failure alarms

2. Transmission failure alarms (responsible for Transmission engineers)
    1. LAPD alarms
    2. Intermittent failures (due to rain, mist, loose connections)
    3. BTS Site failure alarms

3. Power failure alarms (responsible for power engineers)
    1. Site Power failure alarms
    2. BSC Power failure alarms
    3. Temperature alarms
    4. Fan module alarms
    5. BTS Site failure alarms

Additionally

* MSC equipments alarms –NSS engineers
* Interconnection failures –OMC /NSS engineers
* Call failure/drop alarms –NSS engineers
* Interconnection blocking alarms -OMC
* Transmission specific alarms (E1 errors, ODU/IDU failures, AGC level)

2.2.3 System Architecture

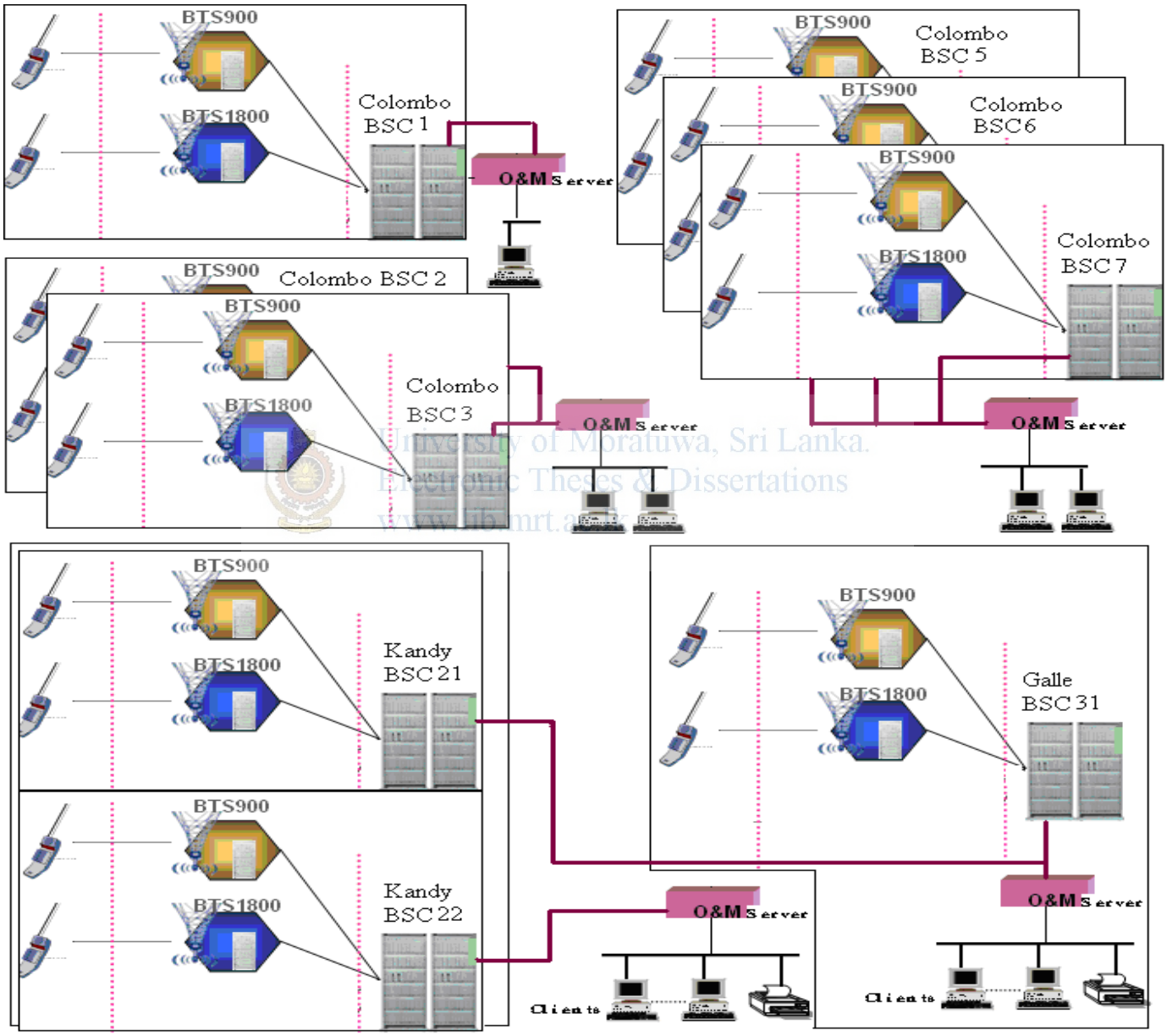

Figure 2.1 – System Architecture

Alarms are created on **BTS** sites and send to its **BSC** .They are collected by 5 "**O&M**" Servers at each **BSC** belong to one Server and each Server has one or more than one (1 – 3) **BSC**s. Each **BSC** controls maximum 50 **BTS** sites.

- Server1 – BSC1 -50 BTS sites
- Server2 – BSC2 -50 BTS sites
  BSC3 -50 BTS sites
- Server3 – BSC4 -50 BTS sites
  BSC21 (Galle BSC) -50 BTS sites
  BSC31 (Kandy BSC) -50 BTS sites
- Server4 – BSC5 -50 BTS sites
  BSC6 -50 BTS sites
  BSC7 -50 BTS sites
- Server5 – BSC22 (Anuradhapura BSC) -50 BTS sites
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Figure 2.1 shows System Architecture of Hutchison Telecom Alarm monitoring system. For Alarm monitoring, Hutch OMC has client machines,(One client for each Server) which operate for Site creation , Software version updates, Tracing, Monitoring, Dynamic management, Report generation and all Daily Operations other than Alarm Monitoring. For Operation and maintenance System manufacture (ZTE china) is given alarm monitoring system.

Existing ZTE alarm monitoring system uses client machines. All the alarms are collected by Servers and Client can access via alarm monitoring quarries and shows on its own interface (Tree view).

2.2.4 Problems and Weaknesses of the Existing System

There are five client machines for alarm monitoring. Moving to each machine and query individual site's alarms is a big problem for quick and effective system. It is very difficult to check more than 500 BTS sites one by one.

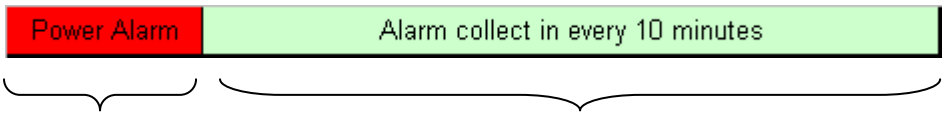
- Existing system can't identify critical alarms. And it always gives the alarm sounds.
- System is not given colour indication for important alarms.
- Site battery bank duration is not given. Hence it is unable to estimate site failure time after power failures.
- Other than alarm monitoring, client machine uses for all the maintenance functions of **BSC** and **BTS**s such as Site creation, Software version upgrades, Tracing, Dynamic monitoring and management, Report generation. With other operations in same client, alarm monitoring is difficult for quick failure recovery.
- Moving to each site click one by one and check whether it has alarm, this is not feature of good alarming system. At glance system must give clear picture of all current critical alarms.

2.3 Alarm macro

This is an alternative system which runs scripts with windows automation for a given schedule repeatedly. The **Alarm macro** collects all the alarms of 5 Servers on **One Client** machine by automated queries. It is little easy as it only queries important alarms and also giving them different colours.

* The script runs only once for every 10 minutes and it is not real-time alarm monitoring.

As example, “Power alarm” takes around 2 minutes to reach its client from origination point. If alarm system runs in every 10 minutes; maximum 12 minutes take OMC client to show it.



System delay 2min + Alarm collecting delay maximum 10 min = Total max. Delay 12min

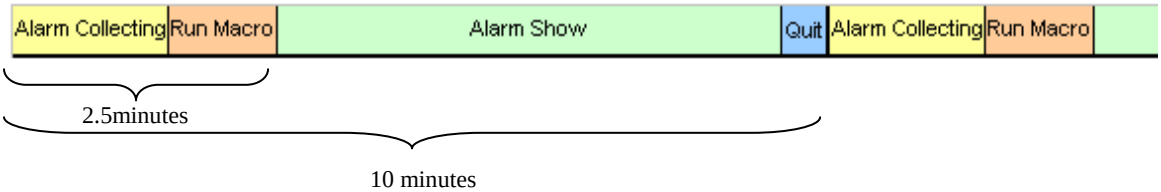
* Another disadvantage is collected alarms sorts using VB macros on Ms Excel and publishes as Webpage, not Standard Graphical Interface which universally use.

* When adding a new Server we have to modify program with new settings.

* When adding Alarms, the program should be modified.

* When collecting alarms, **Alarm interface** automatically quit and run automation scripts. Officers are unable to monitor alarms until it completes collecting the alarms and publish. (Alarm collecting takes around 2.5minutes)

Alarm shows only 7.5 minutes for every 10 minutes period.



* Alarm macro some times not shows “Site out of service” alarm clearly.

Reason: -

1. New sites which are still not commissioned added to the O&M servers. They give “Site out of service” alarms once they are created.
2. Actual “Site out of service” alarms are given by already commissioned sites only.

To identify this difference everyday Alarm macro takes commissioned sites database at given time. Then it identifies actual Site failures by comparing, Alarm database +

commissioned sites database. Some times for different reasons commissioned site database is not clear for all the sites. And cause to “Site out of service alarm” not given.

Comparison of Different Approaches

Feature	Hutchison Alarm Monitoring System	Huawei iManager T2100 Network Level Management System[8]	Alacatel-Lucent 5526 Access Management System(AMS)[6]	Fujitsu GeoStream A500 Ethernet-PON System[7]
Capacity	Up to Oracle database capacity	Can manage 150,000 current alarms and 1,000,000 history alarms	include Alarm history	-
Log	Logs depend on original ZTE alarm database capacity	Can store 1,000,000 logs	Have Logs	-
Alarm Respond Speed	Depend on Network speed	< 60 seconds	not specified	Very high
Integrated with other Systems	Only for Alarm monitoring	1. End-to-End circuit scheduling 2. Equipment maintenance 3.Central resource management	1. Software Downloads 2.Database backup & restore 3. Performance monitoring 4. fault management	1. Port status information 2.SNMP alarm collecting system 3. Cable faulty identifying
Compatibility	Yes	Need to do proper survey	Need to do proper survey	Need to do proper survey
Cost	No Cost	Very high	Very high	Very high
Centralized	Yes	Yes, but need to install additional instrument	Yes, but need to install additional instrument	Yes, but need to install fiber optical network

Table 2.1 – Comparison of Different Alarm Monitoring systems

2.4 Comparison of Different approaches

Table 2.1 shows the table of comparison and it shows what is the important of new proposed system, and following is comment on the comparison.

- With respective to the other systems Hutchison Alarm Monitoring system is developed with no cost, other system costs are very high.
- Without proper survey we can't tell the compatibility of other products.
- With the market competition, Telecom equipment providers do not allow to integrate their software system with other competitors.
- All the other systems are not just Alarm monitoring systems, and alarm monitoring is one component of their total product, also we have to install their additional instruments.

With respect to the above reasons, the proposed system is seems to be the best product.
Let's look at what are the advanced features of other system than proposed system.

- Fujitsu GeoStream A500 [8] is uses fiber optical network, and customers have to additionally spend high cost for Fiber network. But its data speed is very high.
- Huawei iManager T2100 system [9] can store 1,000,000 logs and hutch proposed system has not this feature.
- Huawei iManager [9] Alarm respond speed is <60 seconds but hutch proposed system speed depends on LAN speed.

Thought above features are advanced than Hutch new system, high cost and compatibility issue are the failures of other systems.

2.5 Summary

This chapter discussed with other Alarm monitoring systems and comparison with proposed system. Problems and weakness of existing system, Advantages of new proposed system are identified. Next chapter is about the technology adapting for the solution, advantages and disadvantages of each technologies.