Modernization of a Telecommunications System

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Abstract *— The purpose of the project was to provide a more robust telecom system with new technologies that provide faster upload/download speeds to users. It was found that by doubling the 3G digital units and adding a new D.U. for LTE 4G the network was sufficiently lighter to provide a better data service to customers in the metro and rural areas of Puerto Rico.*

Key Terms *— Data, Speed, Digital Units, Ericsson*

INTRODUCTION

TelecomPR addresses its wish to improve its telecommunications network by utilizing Ericsson's new 6k series radio base station which unites all technologies under one same roof providing space convenience and easy integration. TPR seeks to obtain new subscribers and fulfill their increase of data usage per subscriber. Consequently, wanting to handle more traffic in their networks new technologies and expansions are to be put in place from gsm, umts and lte.

Upon discovering how many sites they need to work on, the amounts of equipment to be installed have been identified and summarized. Beginning with metro area grids until the rural area sites. Gsm and umts will be migrated to new equipment whereas lte will be placed anew in new digital units. Moving up from legacy technologies and infrastructure is a hard feat to execute in itself. Service Providers have understood this and that's why they should contact Ericsson for their consolidation needs. As the transformation begins and continues it will allow for uninterrupted services as they move towards larger more robust system in which virtualized, software-defined services are given to the user. Such an experience will likely attract new customers to join the winning company.

IMPROVEMENTS

Ericsson & TelecomPR's subscribers' expectations continuously grow and retaining their business means updating outdated networks. With a newer network infrastructure, they will generate more revenue per square foot than in older technology. Power bills will be reduced by uniting multiple cabinets, amplitude in bandwidth will help augmentation of users per cells and wasted space will become available in its pad. With the constant support of Ericsson's expert project teams TPR will build competitive strength, flexibility and longevity into their network to best compete against other providers.

An example of the type sites being implemented will be in the format presented next swapping RBS 2106 and RBS 3106 to RBS 6000. Type site #1 will take the existing configuration for 181 Sites and is shown in Figure 1 on a RBS 6000 cabinet as follows:

- RBS 3106 for UMTS 850/1900
- RBS 2106 for GSM 850
- 72 RBS 3106 with Baseband Modernization
- Swap existing RBS3106/2106 with RBS 6102
- 2 Digital Unit WCDMA (DUWs) per site (1x DUW41, 1x DUW30 (UMTS)
- 1 Digital Unit GSM (DUG) per site
- RRUS12 850 B5 MSMM UMTS/GSM
- RUS01 1900 B2 inside the cabinet
- LTE 700 / 2100 (AWS) installation
- LTE 700 MHz: RRUS11
- AWS/AWS-3: RRUS11 & RRUS32
- 9 RRUS (Remote Radio Units) on tower

Having described the elements to be changed during the swap, we can observe in Figure 1 how the RBS 6k Series will contain all technologies, GSM/UMTS/LTE, under one same cabinet.

Figure 1
Technology Placement RBS 6k

To better understand the new final compact setup, one can see the legacy equipment in Figure 2. How the RBS 2k Series Family for GSM had more elements in both the indoor and outdoor version of the cabinet.

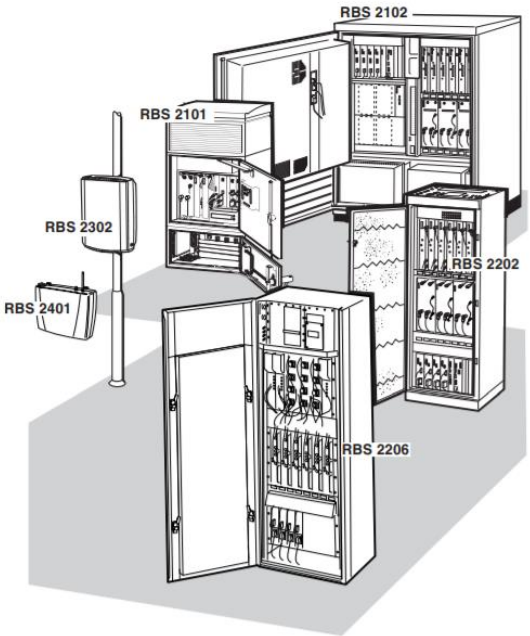

Figure 2
RBS 2K Series Family GSM

In addition, Figure 3 depicts the RBS 3k Series Family for UMTS in its indoor and outdoor version of the cabinet showing a similarity in dimensions and amount of equipment they possessed.

Figure 3
RBS 3K Family UMTS

Lastly, Figure 4 shows how Ericsson managed to compress both 2G & 3G technologies plus add the new 4G Lte into its common RBS size by using remote radio units or RRU's, by its abbreviation. The usage of external hardware frees up space inside the cabinet and passes its weight on to the tower side along with the antennas.

Figure 4
RBS 6k Family GSM-UMTS-LTE

EXPECTED RESULTS OF MODERNIZATION

The modernization priority is based on capacity reports from previous years in which the client understands they need improvement first to gain a boost in service. Priority will be given to clusters in which a third carrier, for the 850MHz band UMTS (3G), expansion is required. Clusters are divided by municipalities and existing equipment on site. The first phase of the project will undertake the old RBS 2K & 3K swap for the new RBS 6k, as seen first in the Figure 4 left hand side, and the second phase will have the new RBS 6k in place ready for the expansion in technologies 3G Umts & 4G Lte.

Rollout sub-clusters are used to define geographical areas & logistics where the activities will be implemented. The interventions of the network are carefully planned and executed in a controlled environment so they can least affect the areas being serviced at once.

Just like in a similar competitors business venture [1] Teligent extends the life of existing IT and Telecom systems whilst connecting to the latest technologies and protocols. Modern mobile services providers look to reduce costs, implement new technology and migrate from old equipment to new supported technologies. As with our project the upgrade in hardware requires replacement or addition to whole BSS / OSS systems (Software), run parallel systems, or make new systems backward compatible. Cost savings can therefore be achieved by consolidating to a single multi-application platform, eliminating the need for 'parallel running', or by migrating old platforms to lower footprint, higher density modern systems architectures, reclaiming space, power and updating security and resilience.

Potential problems that might arise once the swaps begin are new alarms presented by the new migrated equipments upon replacing old legacy radiobases. The client will have this issue very present and expect them to be resolved before closing out the sites. Alarm free approvals are a must and should be taken care of before close-out packages are submitted for technical acceptance of “In-service” nodes.

The radio frequency team will be at the beck & call of the field engineers to guarantee service affecting activities are done in a prompt manner. The coordination between the integration and initial tuning teams will ensure a smooth transition between the legacy equipment and the modern 6 thousand series family.

CONCLUSION

After attacking the sites as planned the results were obtained as expected. The legacy equipment, 2k & 3k series RBS’s, were taken off-line and removed from the site via cranes and trucks to have a cleaner client pad thus gaining savings in ft square per collocation site, referring to the tower provider & the rented space on the ground. As projected the gsm & umts services were doubled from their previous setup, gsm having old TRX radios and umts the combinations of RUS/Filter Units to remote radio units up in the tower side. LTE came anew with rru’s for the 2100/700MHz band thus exploding the 4G lte market and previous speeds used in web browsing. The major concern TPR had was increasing their performance without new alarms and this was achieved successfully, the lte equipment was incorporated beautifully and had major acceptance in new throughput peaks obtained in the weekly kpi’s the RF team recollects. The new rbs 6k still has space for future expansion upon new bandwidths becoming available and/or new technologies arising.

REFERENCES

[1] Teligent Telecom. (2019, March 31) Teligent Legacy System Integration Retrieved from: http://www.teligent.se/legacy-migration.html