The Impact of the Transport Architecture of Radio Access Networks to Operational and Capital Expenditures

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Several new approaches for future IP-based radio access networks (RAN) have been proposed. This poster will classify these approaches into two groups, Controller-based RANs (DRAN) and Distributed RANs (DRAN) as it is shown in Figure 1. These two classes will be depicted concerning their different transport architectures (Figure 2, Figure 3). A cost analysis utilizing a detailed planning process allows for studying the impact of different parameters of the network configurations. The network planning and optimization tool TRIAS was used to compare the CRAN and DRAN approach with respect to their operational and capital expenditure. Therefore it was necessary to utilize a detailed and exact planning method to generate about 2500 different network configurations. The results are shown in Figure 4. From the exact figures it can be seen that a network following the DRAN approach will be approximately 20% more expensive than a network following the CRAN approach. This is the case even when the DRAN approach can reduce the product out off link lengths and link capacities by 28%. Thus, this poster will show that it is not suitable to use this parameter in network optimizations as well as in evaluations. The minimal link costs of both approaches are quite close together. The mean utilization of the network increases and thus also the delay increases in case of the DRAN. If the base stations of a DRAN approach will be more expensive than the ones of the CRAN approach, than also the overall DRAN network will be of higher expense. However, by means of the analysis of the cost areas (Figure 5) of both network architectures, it can be shown that the DRAN approach also provides some benefits. The cost of the DRAN approach is less sensible with respect to modifications to the network than the CRAN approach. Chaining of base stations results in larger cost areas but does not give the opportunity to generate a network with lower monthly cost. This is valid for both RAN approaches.

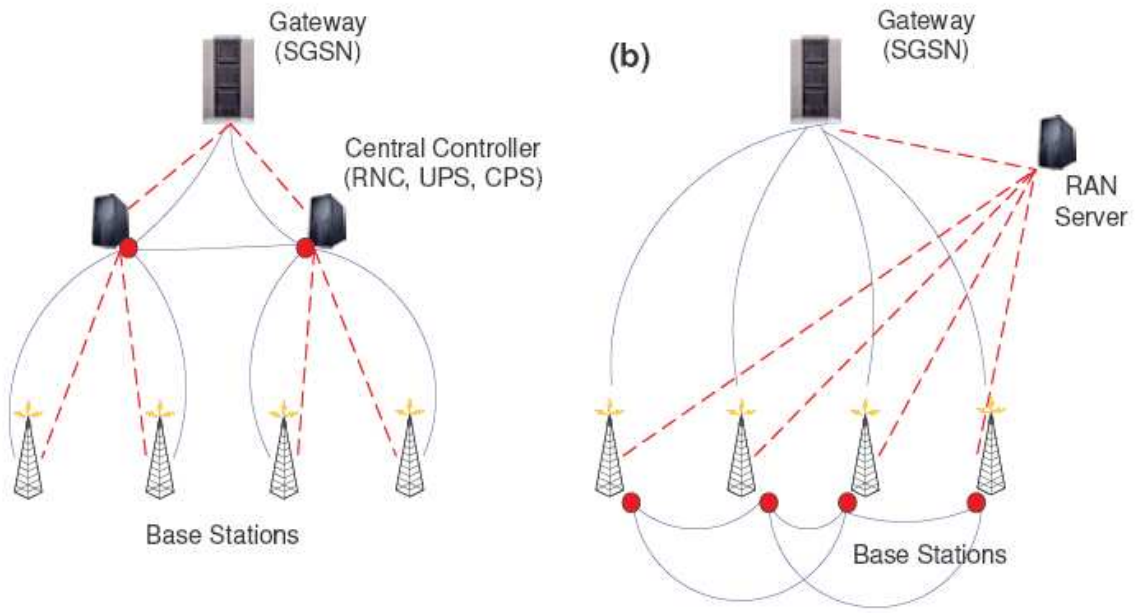

Figure 1 - Two different RAN Architectures (a) CRAN and (b) DRAN

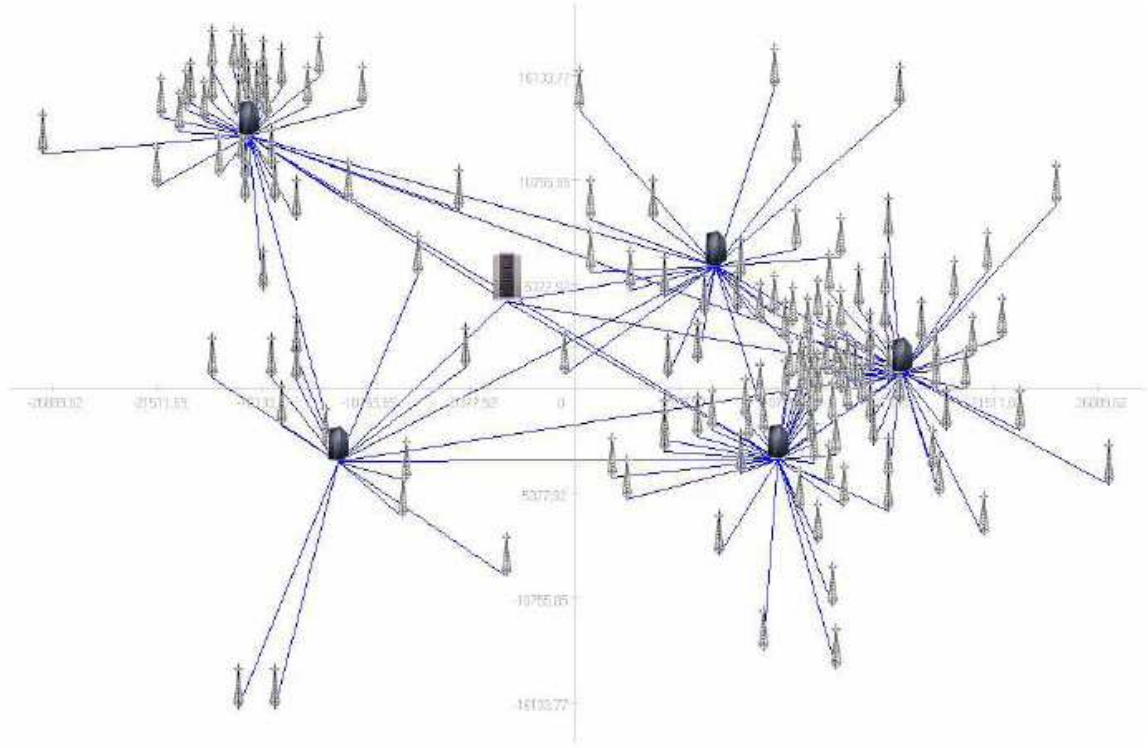

Figure 2 - The logical Network of the CRAN Approach

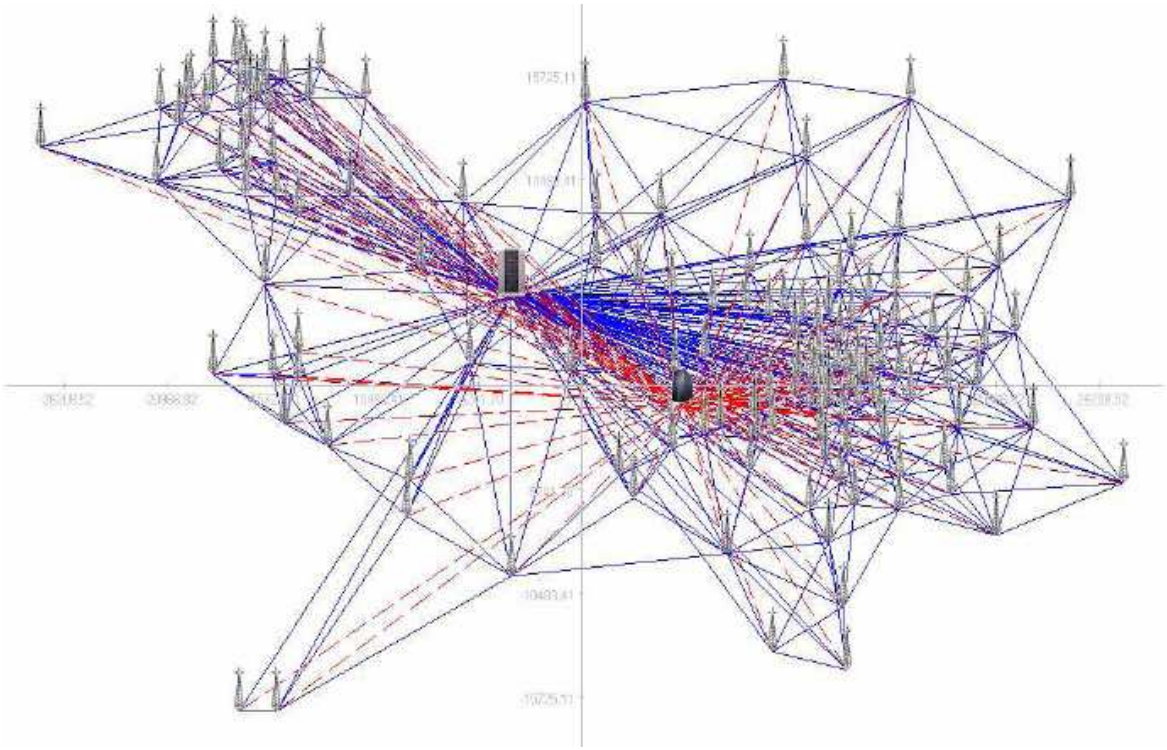

Figure 3 - The logical Network of the DRAN Approach

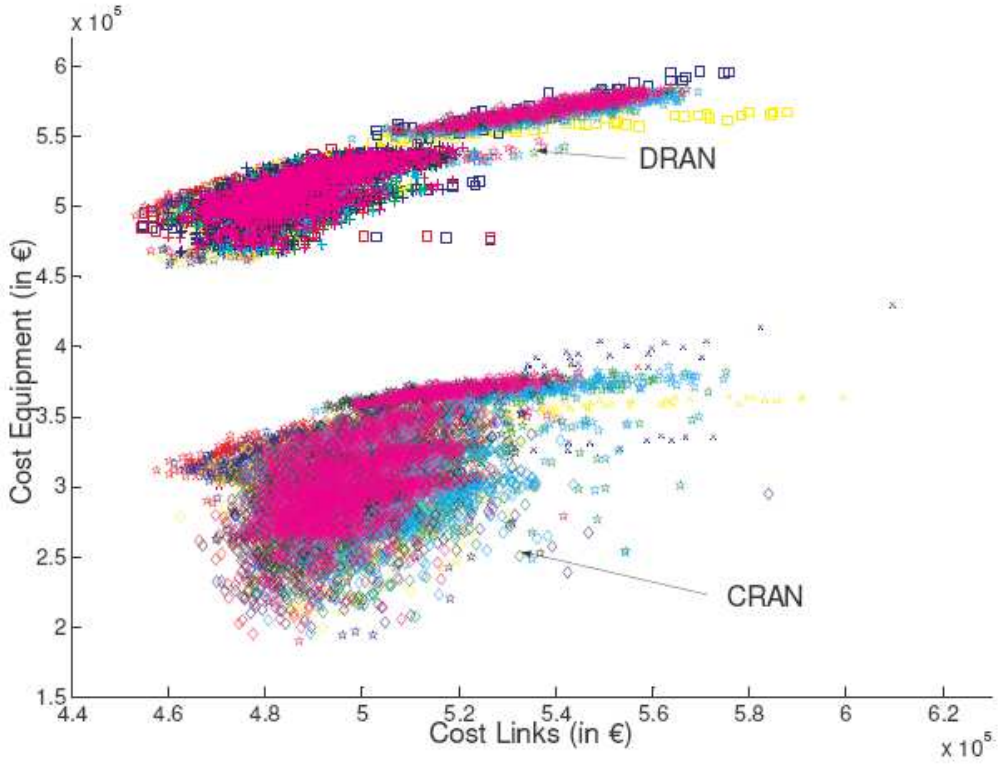

Figure 4 - Comparison of 2500 networks of the CRAN and DRAN Approach

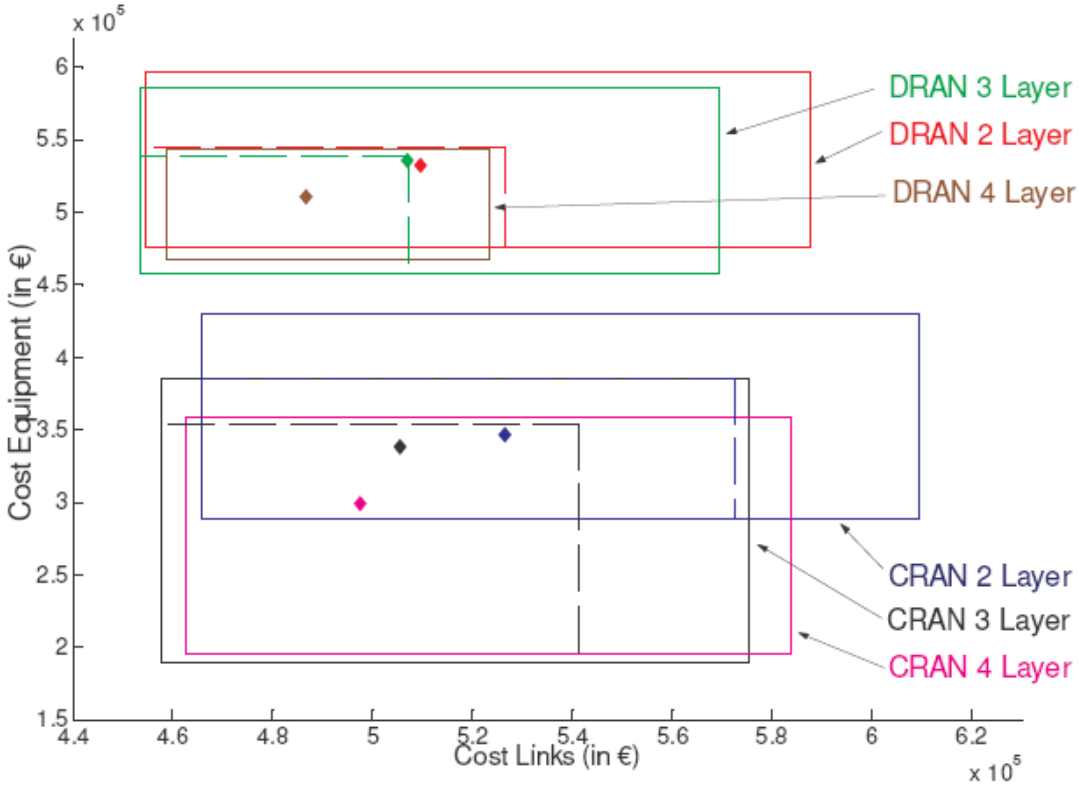

Figure 5 - Analysis of the two RAN Architectures by means of Cost Areas