

## GPRS-136 Core Network Dimensioning and Planning: A Roadmap (Sponsor: Nokia Networks)

The main goal of GPRS-136 is to integrate itself with GSM GPRS as much as possible with minimum changes to both technologies. To that end, a separate functional GSM GPRS HLR is incorporated into the architecture of GPRS-136 in addition to TIA/EIA-41 HLR (see Fig. 1), in order to provide subscriber roaming between GPRS-136 and GSM GPRS. The general approach of GPRS-136 is to overlay the circuit-switched network nodes with packet data networks for service provisioning, registration, mobility management, and accounting. Internetworking is provided between the circuit-switched and packet data networks for mobiles capable of receiving both services. Furthermore, GPRS-136 allows a user engaged in an active data transfer to suspend operation should the user wishes to make or receive a call. Depending on the data operation being performed, the data transaction may be resumed once the voice call is completed

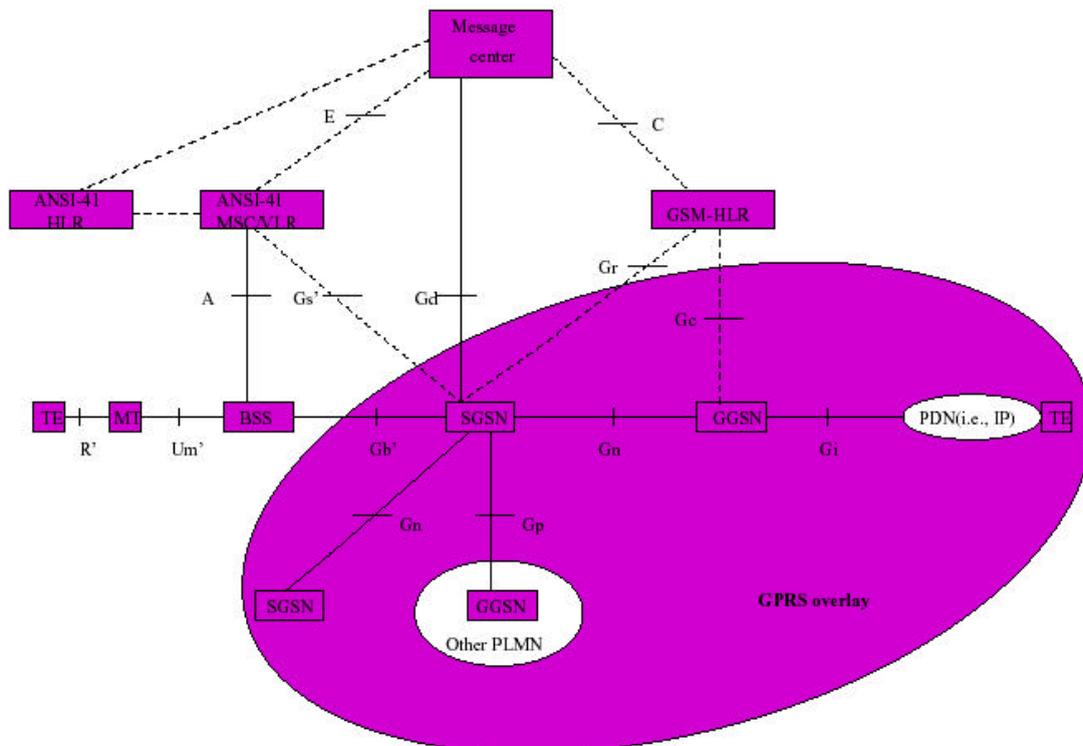


Figure 1. GPRS-136 Network Architecture.

The focus of this project is to provide simple guidelines for GPRS-136 Core Network Dimensioning and Planning. To that end, our research has resulted in providing

- A general framework for Core Network Dimensioning.
  - The utility of this general framework is illustrated via simple examples. Simple procedures for calculating all the key network elements in GPRS-136 and GSM GPRS are also provided. Through a performance analysis it is shown that, the delay performance of possible scenarios is an important

factor in making decisions. The project also investigates the robustness of the 4 illustrative scenarios (see Fig. 2) to “cloud” failures. Finally, the roles of security, availability, and downtime (in addition to QoS) are examined in choosing the transmission technology of a “cloud” and specific recommendations are made.

- Key issues in GPRS-136 Network Planning.
  - It is shown that the most important issue in network planning is choosing an appropriate network topology and architecture. To that end, a formalism for optimizing network planning is presented which leads to an optimization algorithm. The usefulness of the algorithm is demonstrated via simple examples, which attempt to show that even though this is a multi-dimensional constrained optimization problem, by making simplifying assumptions one could obtain tractable solutions.

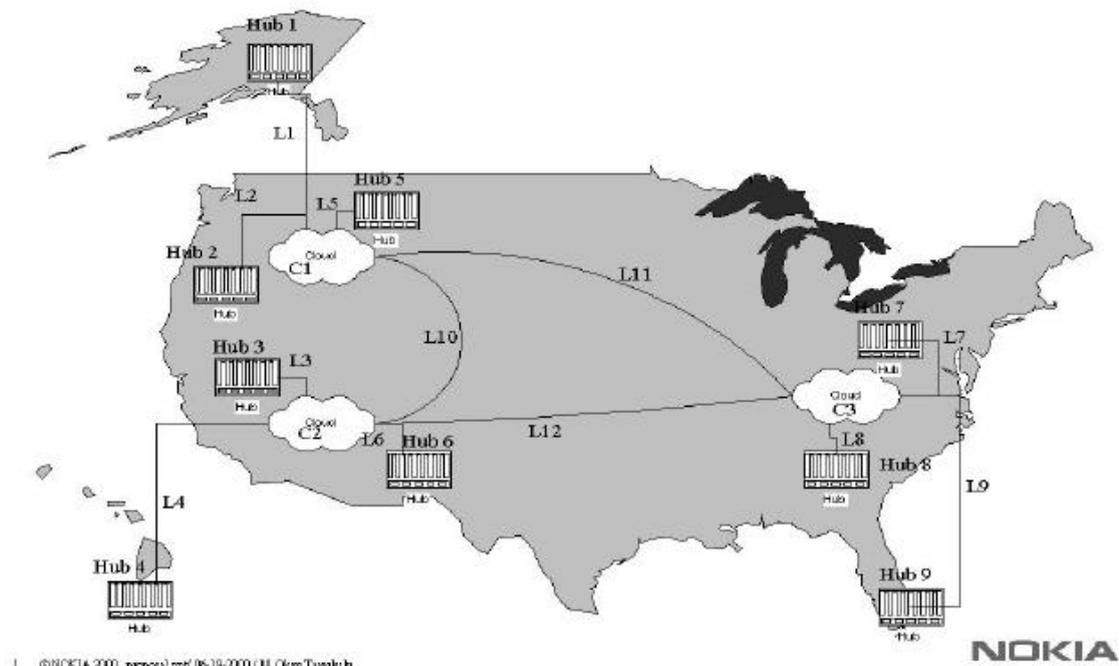


Figure 2. Scenario under investigation

## REFERENCES

- [1] O. K. Tonguz and A. E. Xhafa, “GPRS-136 Core Network Dimensioning and Planning: A Roadmap”, Technical Report, 2001.