Planning and implementation of a measurement campaign to settle the handover functionality in an indoor GSM network

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Introduction

• In GSM networks outdoor coverage and services are well managed today

• The huge growth of capacity demand had led to a need to build up indoor networks

• Indoor environment is totally different from outdoor environment: Propagation circumstances; smaller cells than in normal outdoor network; cells are layered in three dimensions

• A remarkable part of the indoor network management is associated with the handover management

• A handover measurement campaign shall be organised to clarify the handover functionality

• The background for this thesis was the fact that till now exists only little documentation, which concentrates on the planning process of an indoor handover measurement campaign

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Introduction (continued)

• Scope of thesis

The topic of this study is to find the important milestones of a handover measurement campaign planning process for an indoor environment and to find the corner stones for a successful campaign.
Presentation of the method

- The study was done by performing the plan for a real handover measurement campaign as a part of an indoor GSM trial
- After the implementation of the measurement campaign, the planning process account of the campaign was verified
- The final account of the planning process was made including the most important milestones
Results

The planning process of a handover measurement campaign is described in thesis

• The planning process can be divided into the following main phases
  – Preconditions of a measurement campaign
  – Practical pre-work
  – Network pre-analysis before coming to the campaign site
  – On-site check of the analysis
  – Interpretation of the network analysis
  – Pre-measurements
  – Generation of the final measurement campaign plan

• A block diagram of the planning process is shown

• A check list of the handover measurement campaign planning process was generated and it is shown in thesis

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Planning process of an indoor handover measurement campaign

Start of the planning process

Preconditions
- Campaign definition
- Resources
- Tools and accessories
- Personal skills

Pre-work: practical issues
- Maps and ground plan dr.
- Agree on SIM-cards
- Office with accessories

Pre-work: network analysis

Check the analysis

On-site pre-work: practical issues
- Co-operation with O&M
- Verify the ground plan drawings

Generation of final campaign plan
- Pre-measurements
- Problematic HO areas
- Final test routes, schedule

End of planning phase

Implementation
- Keep campaign notebook
- Measurement results
- Documentation
Own contribution

- The pre-analysis of an indoor GSM field trial network was performed (and the on-site check of it)
- The handover measurement campaign plan was generated
- The campaign plan was executed in a hard partitioned high rise building
- The implementation phase was evaluated
- The planning process was verified and the corner stones of a campaign were studied
Conclusions

The most important milestones in a planning process are:

• Preconditions of a successful campaign:
  – Campaign definition
  – Measurement tool choice

• The precise network analysis:
  – Analysis before coming to the campaign site
  – On-site verification of the network analysis
  – Importance of the network’s visualisation
  – Co-operation with O&M personnel (this includes the agreement concerning the division of the daily measurement period versus the maintenance period)

• Well-planned pre-measurement routes
• A realistic campaign schedule
Further investigations

• Planning process should be investigated in a trial based on the basic GSM network structure and the basic software

• How the results of this study are applicable into different network scenarios? An interesting subject could be a hierarchical network structure consisting of both indoor and outdoor cells / Impact on the planning process

• Investigations concerning the work effort in a certain part of the campaign planning process / Impact on a campaign schedule

• What is the possible impact of a GPRS network with packet service for the planning process?