



2G, 3G Network Planning and Optimization...

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2 GSM Radio Network Planning

2.1 Overview

The design of radio network planning (RNP) is the basis of the construction of a wireless mobile network. The design level of network planning decides the future layout of a network.

During network planning, the documents concerning base station distribution, channel assignment, and cell data must be outputted. And the major tasks involved are as follows:

- 1) Analyze carriers' requirements on network coverage, capacity and quality.
- 2) Analyze the coverage and capacity features of the candidate mobile communication systems and bands, and then analyze the investment feasibility through estimating the network scale.
- 3) Decide the network structure and base station type based on further analysis.

First analyze whether to construct a layering network according to user distribution, propagation conditions, city development plan and existed network conditions, and then analyze the sites within this area to decide whether to use omni antennas or directional antennas to meet the requirements on coverage and capacity.

4) Estimate the number of base stations

Before estimating the number of base stations, estimate the coverage distance of base stations of various types in various coverage areas. The factors deciding the effective coverage area of a base station include:

- Valid transmit power of the base station
- Working bands to be used (900 MHz or 1800 MHz)
- Antenna type and installation position
- Power budget
- Radio propagation environment
- Carriers' indexes on coverage

Then through calculating the coverage distance and dividing the coverage areas, you can obtain a rough number of base stations for various coverage areas.

5) Plan an ideal base station address according to cellular structures.

According to geographic maps or administrative maps and with the help of on-the-spot surveys, you can have a full understanding of the areas to be planned, and then mark the area where the number of users is large as a target address. After that, mark the addresses of other base stations according to the ideal cellular structure and the result of link budget.

6) Calculate the number of channels of the cells of each base station

- Estimate the traffic of a base station according to its ideal location, and then obtain the number of carriers and channels needed by each base station by checking Erl table according to the indexes of call loss rate.
- Decide the frequency reuse mode according to band width, network quality requirement, and equipment supportability.
- Estimate the maximum base station configuration type according to the frequency bandwidth and reuse mode provided by the construction carriers. If the system capacity in some areas cannot be met, you need to add more base stations or cells to the system according to cell splitting principles and actual conditions. After that, reselect an ideal base station address on the map and re-estimate the number of channels required by the base station.

7) Predict the coverage area and decide the project data, namely, perform the preliminary emulation.

The specific tasks are as follows:

- Select the design indexes

Select the minimum received power and the penetration ratio index at the coverage area edge.

- Select the design parameters, which includes:

Antenna height (above the ground), antenna azimuth angle, antenna gain, antenna tilt angle, base station height above sea level, base station type, feeder length, antenna feeder system loss, combining and distribution modes, transmitter output power, receiver sensitivity, base station diversity reception, and diversity gains.

- Predict the coverage area of each cell according to the propagation models in different areas, and then give the opinions on adjusting the base station address, antenna direction, antenna tilt angle, and antenna height in the areas where dead zones may be present and signals are poor. Finally, provide the project data.

8) Select actual base station address and decide base station type:

Perform field examination according to the ideal base station addresses, and then record the possible addresses according to various construction conditions (including power supply, transmission, electromagnetic background, and land taken over). Finally, recommend a suitable address based on integrated consideration of the deviation from the ideal base station address, the effect on future cell splitting, economic benefits, and coverage prediction.

After the base station address is selected, decide the actual base station type according to the number of base station channels.

After the base station type is decided, you need to make a scheme for antenna configuration. For moving a network, if you intend to provide a best combination scheme for the antenna feeders, you must fully investigate the combination of the antenna feeders of the original carriers, plan the future expansion of the base station, and design the combination of the antenna feeders supported by current equipments.

9) Plan frequency and adjacent cell

Decide the frequency and adjacent planning according to the actual base station distribution and type.

10) Make cell data

To ensure that the network runs stably, you must design the parameters relative to performance for each

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cell. These parameters include system information parameters, handover parameters, power control algorithm parameters, and so on.

- Note:

For the selection of handover bands, the handover algorithms to be enabled, and whether to use frequency hopping, power control, and DTX, they must be decided in coverage prediction and frequency planning, because the related parameters will be used in emulation.

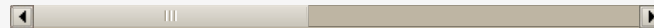
In addition, sections 2.9 and that later introduce the solutions to the planning of dual-band network and the planning in special occasions.

Автор: ourdot на 0:42

0 КОММЕНТ.:

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