Background and Motivation

- Where to place a base station (BS)?
- How to specify BS parameters?
  - Transmitted power
  - Antenna configuration
Why Automated Optimization?

Input:
- Geographical data
- System requirements

Output:
- System performance

Base stations:
- Location
- Power
- Antenna

Network planning tools

www.ng-networks.cn
SFN network planning is more challenging
- Mobile reception
- Indoor coverage
- More senders are required

The tasks of SFN planning include
- Calculate SFN coverage area
- Calculate the overlapping area
- Calculate the time delay
Optimization Targets and Parameters

- **Optimization targets**
  - Maximize coverage
  - Minimize costs
  - Minimize power

- **Optimization parameters**
  - Site location
  - Transmitted power
  - Antenna parameters (type, height, orientation)

- **Optimization criteria**
  - Coverage rate
  - Cost limit
  - Performance-to-cost ratio

**Tradeoff between the coverage and costs**
- Selection of optimum sites out of candidates based on coverage and costs criteria
Automated adaptation of the transmitted power and antenna configurations to achieve better coverage
Case Study: Shanghai

- Area size: 60 km x 72 km
- There are 16 candidate sites
- Planning targets:
  - Area coverage > 90%
  - Pop. coverage > 95%
Site Selection Results

- Running time of site selection: 70 min.
- 9 sites are selected
- Targets achieved:
  Area coverage = 93.42%
  Pop. coverage = 95.73%
Power Optimization Results

- Initial Tx power is 1000 W for all senders
- Tx power of five senders are reduced to 300 W
- The coverage changed slightly:
  - Area coverage = 92.35%
  - Pop. coverage = 95.16%
Conclusions

The challenge
- SFN network planning is more challenging
- More senders are required

The solution
- Automated site selection
- Power optimization
- Antenna configuration

The benefit
- Dramatically reduce the time needed for the planning job
- Cost efficient solution
- Achieve better network performance
- Energy saving due to power optimization
Thank You

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