ITU / BDT workshop

Warsaw, Poland,

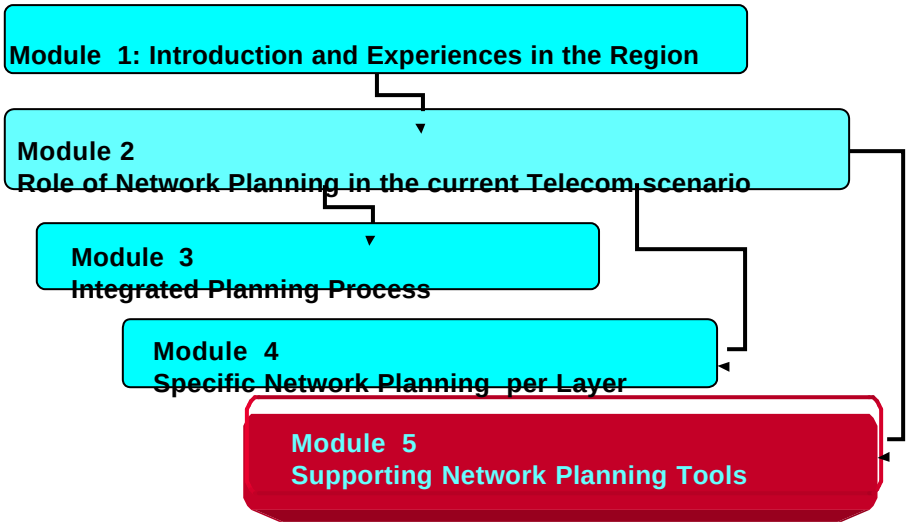
6-10 October 2003

Network Planning

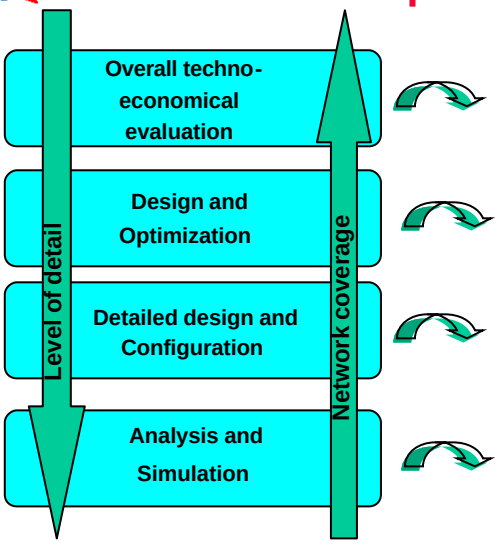
Lecture NP- 5.4

Supporting Network Planning Tools

BDT workshop on Network Planning



Network Planning Tools: Tool examples per category



STEM, Excel based applications

Planitu, NetWORKS (Trans, -Switch, IP, etc.), VPI-Maker, CHIRplus

VPI-Configurator, NetWORKS-Pro, CIRCEE

OPNET,COMNET, SPECTRA

Network Planning Tools: CIRCEE

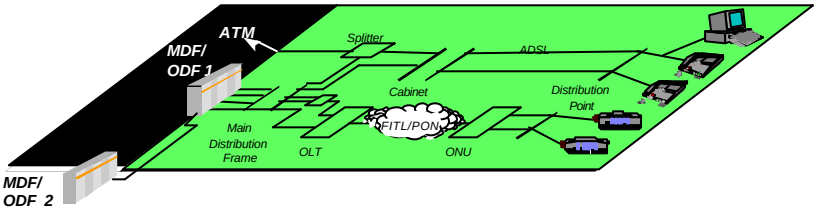
Objective : CIRCEE by Alcatel (in France) is a design, configuration and planning tool for the physical network including Outside Plant. Also handles network inventory and suits well the relation between planning and operational tasks

www.alcatel.com

Network Planning Tools: CIRCEE
OutSide Plant definition & objectives

OutSide Plant definition.

"All telecom equipment and services related to the network installation from the exchange Main Distribution Frame (MDF) or Optical Distribution Frame (ODF) to the subscriber premises (or to other MDF/ODF)"

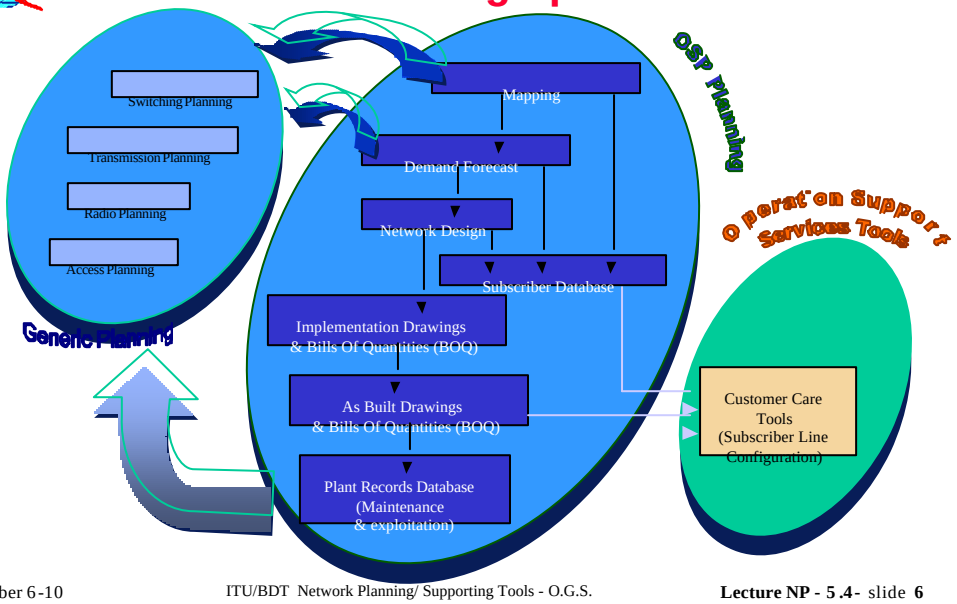


OSP planning objectives.

Optimize the infrastructures (civil works, aerial routes) and the network layout (cabinets, cables, joints,…) in order to provide the forecasted services to the potential subscribers at minimum cost.

Adapt the switching, transmission or radio planning results to the field constraints.

Network Planning Tools: CIRCEE
OSP design process



Network Planning Tools: CIRCEE Mapping

- Mapping is the basis of accurate subscriber locations and optimal infrastructure design

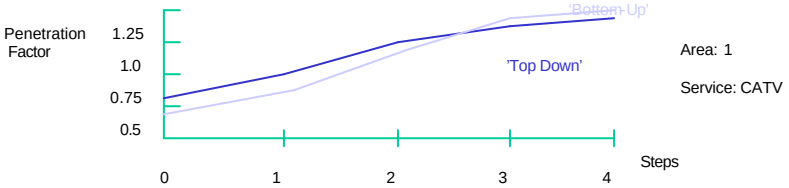
  - Encountered problems:
    - *How to convert the existing mapping documentation in a minimum time, but with up-to-date data?*
    - *Existing mapping may be consistent at microscopic level, but wrong when trying to assemble it on a town or regional level… How to enhanc e the quality of the documentation?*

Network Planning Tools: CIRCEE Demand forecast

- Demand forecast:

  The aim is to compare macroscopic planning results ('Top Down') to the local area specificity (subscribers accurate locations and socio-economical classifications), called 'Bottom Up' approach, and to simulate the forecasts, for an optimized network dimensioning.

  Encountered problems:
  - *How to compare 'top-down' and 'bottom-up' figures?*
  - *How to differentiate forecasts for various telecom services?*
  - *How to handle multi-provider data in the same area?*
  - *How to choose the most realistic forecast figures?*



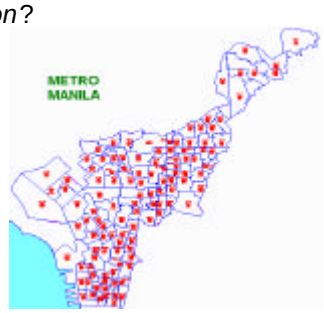
Network Planning Tools: CIRCEE
Network design

- Network design:

Efficient OSP network design should reduce infrastructure costs with respects of the technical constraints and local usage, but give enough flexibility to allow network extensions and to be adaptable to population 'micro-movements'.

Encountered problem:

- *How to choose the best technological solution*?



Network Planning Tools: CIRCEE
Subscriber management

- Subscriber management:

The OSP network data and subscriber location is mandatory for the subscriber line assignment

Encountered problems:

- *How to speed up and optimize the service activation at the front desk of a commercial office?*
  - Simple subscriber geo-location
  - Reservation of equipment for a given subscriber
  - Link with Operation Support Services (OSS) tools to activate the service(s)

Network Planning Tools: CIRCEE
Network maintenance

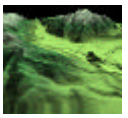
- Network maintenance:
- To be able to improve and speed up future network extension design, it is mandatory to maintain the existing OSP data up-to-date.

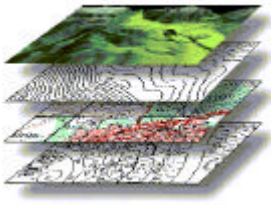
Encountered problems:

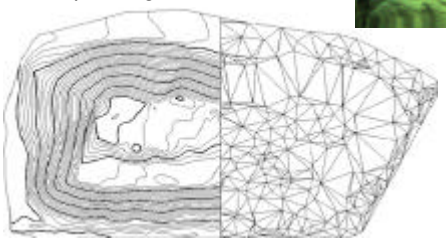
- *How to implement a secured data updating process?*
- *How to give a full view of the network data in a single 'GIS' database (OSP + Transmission + Wireless…)?*
- *How to improve the operation workflow ?*
- *How to give a low cost and scalable 'read only' access to the network plans for the maintenance teams?*
- *How to have a quick and accurate list of the subscribers/services concerned by an intervention on a part of the network?*
- *How to ensure compatibility of Alcatel data with Customer database/GIS tools?*

Network Planning Tools: CIRCEE

- Mapping with a Geographical Information System (GIS):
- Existing documentation conversion.
  - Rasterizing existing maps: quick solution, but basic results can be disappointing…tedious additional cleaning jobs, with help of dedicated raster editing tools is mandatory to get legible results. Conversion from raster to vectorized data is now affordable.
  - Digital Terrain Models (DTM) and Building Elevation Models (BEM) can be used for radio planning control.







Network Planning Tools: CIRCEE

- Mapping with a Geographical Information System (GIS):
  - Optimize documentation quality.

  - Geographical continuum, is achieved by usage of a consistent GIS coordinate system. If a coordinate system is missing, GPS survey of the main street axis gives a good frame to adjust local documentation.
  - 'Topological functions' allow to enhance topo map quality

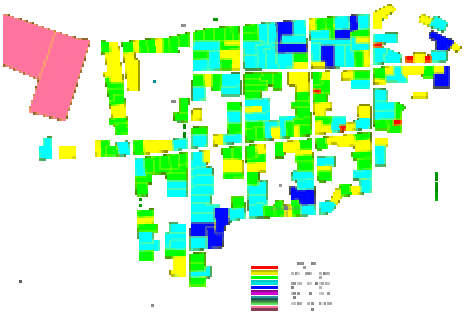
  - Satellite image resolutions are forecasted with a sub-meter accuracy in year 2000

But whatever the solution, a site survey is mandatory!

Network Planning Tools: CIRCEE Demand forecast

- Interactive forecast simulations are needed to optimize the best 'PF' table
- Thematic mapping possibilities can help to analyze the data

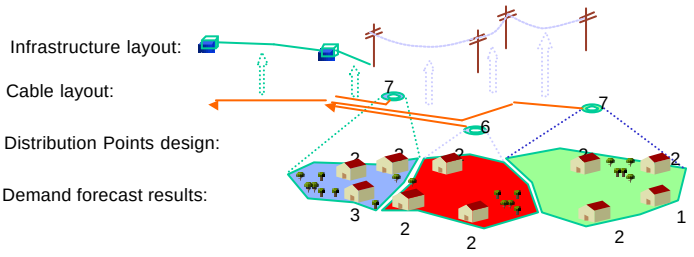
The validation of the final Penetration Factors is always Customer's responsibility!



- Different methodologies:
  - 'Macro Demand Forecast'
  - 'Micro Demand Forecast'
  - Extrapolations of significant areas, investigation statistics...

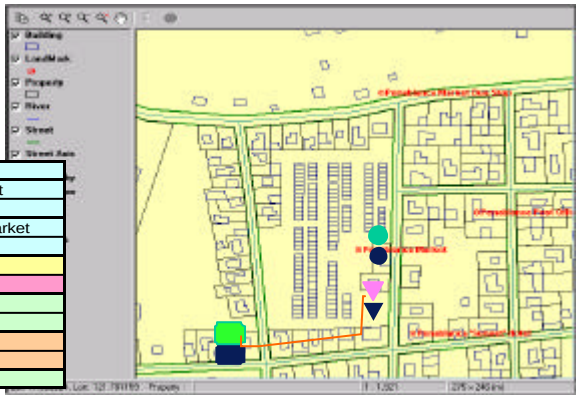
Network Planning Tools: CIRCEE Network design

- Computation of the 'gravity' centers, per year/service, in order to optimize significant network nodes locations (exchanges, cabinets,…)
- Network layout is consistent with infrastructure data
- Cable layout control functions, to automate element codification and check engineering guidelines
- Detailed network design is based on demand forecast results



Network Planning Tools: CIRCEE Subscriber management

- Implementation of an GIS Internet browser in commercial offices, to give graphical access to subscriber locations, as well as significant OSP elements locations and identifications
- Interface with Line Configuration System, to be able to transmit the job order and service activation data.

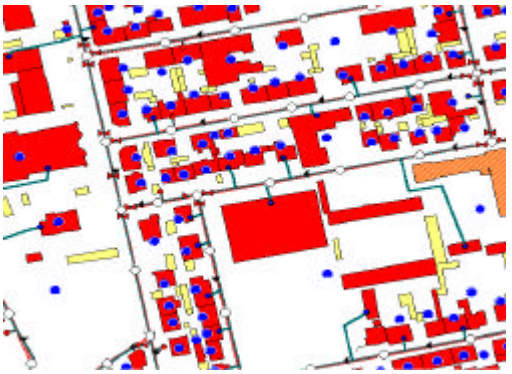


Name:	Arroyo Cesar
Address:	17, Rizal Street
City:	Penablanca
Nearest Landmark:	Penablanca Market
Service required:	Telecom
Results:	
DP:	17
Cabinet:	#003
Exchange	Penablanca
Sec. Pair:	173
Prim. Pair:	89
MDF Fuse	1-2-1-89

Network Planning Tools: CIRCEE
Network maintenance

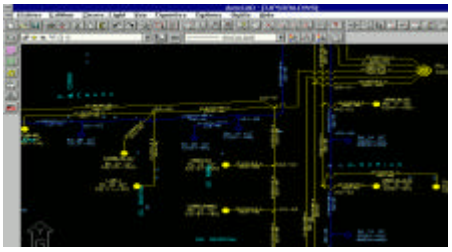
- Current GIS and database have standardized file transfer formats: interoperability is a question of clarifying the data format in details (graphic and alphanumeric)
- By implementing a standard Internet browser in operation centers, users will have an easy access to current plans and data.

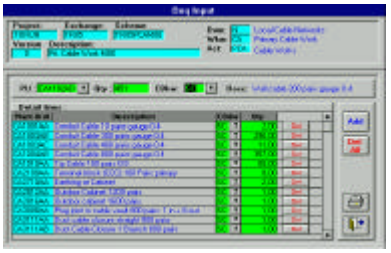
- Interfacing OSS and OSP maintenance tools is to be improved.
- 'Network Plant Record' Department must be centralized, to have a single authorized data updating center.



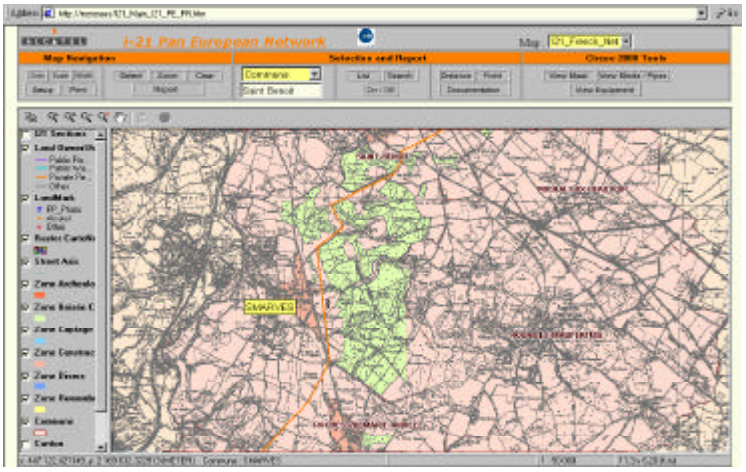
Network Planning Tools: CIRCEE
Competitive environment: added value

- Circee is a field proven tool
  - implemented in various countries (France, Pakistan, Thailand, Bangladesh, Philippines, Poland,…)
  - used to design over 2 million telecom lines, since 1986
- Circee leaves a structured information for the Customer
  - Structured graphic files, respecting the local drawing standards
  - Detailed alphanumerical data of the network and the subscribers, accessible via Intranet, and customisable

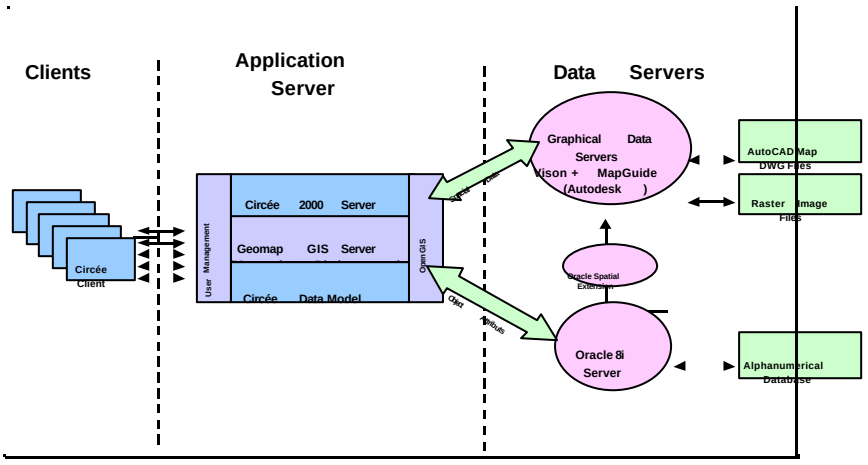




Network Planning Tools: CIRCEE
Map visualization

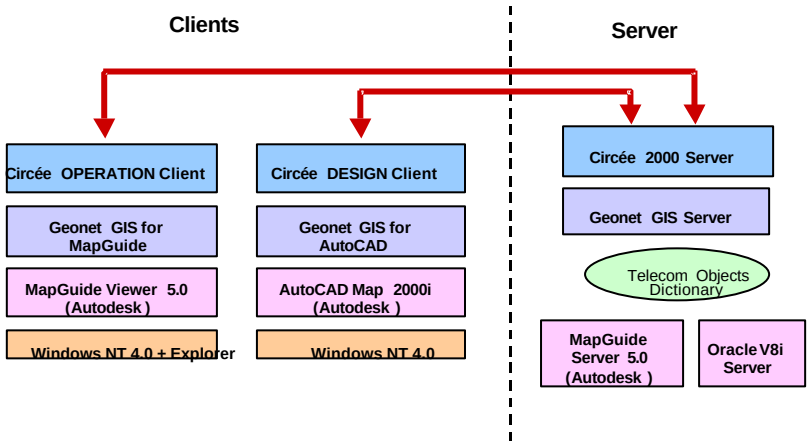


Network Planning Tools: CIRCEE
Client server structure



Network Planning Tools : CIRCEE

Software architecture



Network Planning Tools : CIRCEE

CIRCEE 2000 is based on the following platforms :

1. AutoCAD from Autodesk : The AutoCAD engine provides the sophisticated functions needed to cover all the graphical Telecom Operator constraints.
2. AutoCAD Map adds the complementary elementary functions to cover the mapping raster issues, as well as the major graphical format conversions.
3. MapGuide from Autodesk : The MapGuide solution allows a low cost and scalable Intranet/Internet access to the graphical and alphanumerical data, using the WEB navigator Explorer 5.5 from Microsoft.
4. Oracle V8i from Oracle : The Oracle 8i server is used to implement the RDBMS. The Oracle Spatial Cartridge improve the management efficiency for a wide number of spatial objects and attributes.
5. Geonet GIS from Geomap : Based on Autodesk solution, Geonet implements all the services required by a complete Geographical Information System (GIS).
6. Finally, a CIRCEE 2000 layer implements a data model and the rules dedicated to Telecom Operators