ITU / BDT- COE workshop

Nairobi, Kenya,

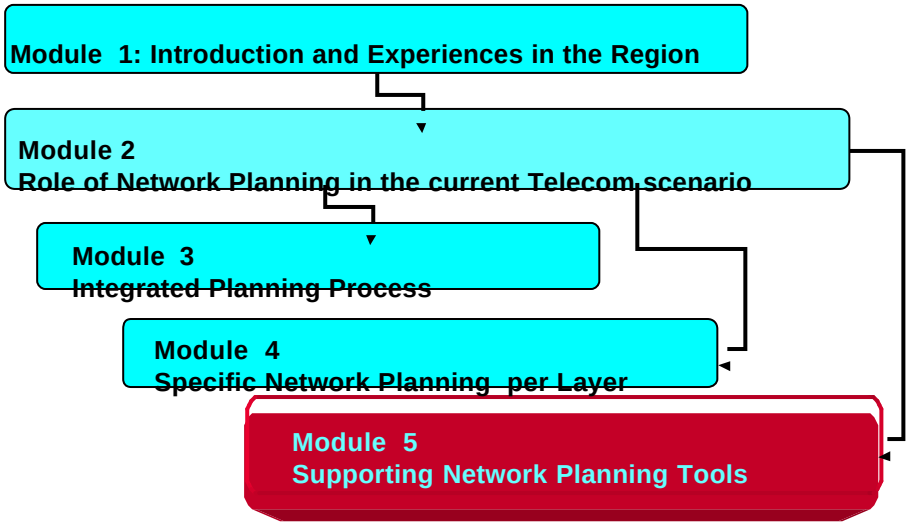
7 – 11 October 2002

Network Planning

Lecture NP- 5.3

Supporting Network Planning Tools

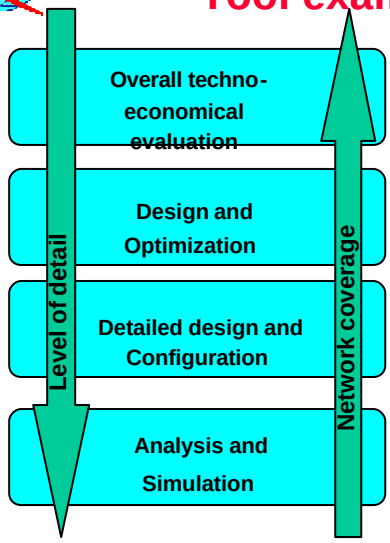
BDT - COE workshop on Network Planning



Content Chapter 5.3
Network Planning Tools

- Objectives and classification for the different tool types
  - Overall techno-economical evaluation
  - Network design and optimization
  - Network evaluation and simulation
  - Tool mapping per class

Network Planning Tools: Tool examples per category



STEM, Excel applications

Planitu, NetWORKS-Trans, NetWORKS-Switch, VPI, TSP, NetQUAD, RNP

NetWORKS - Pro, CIRCEE

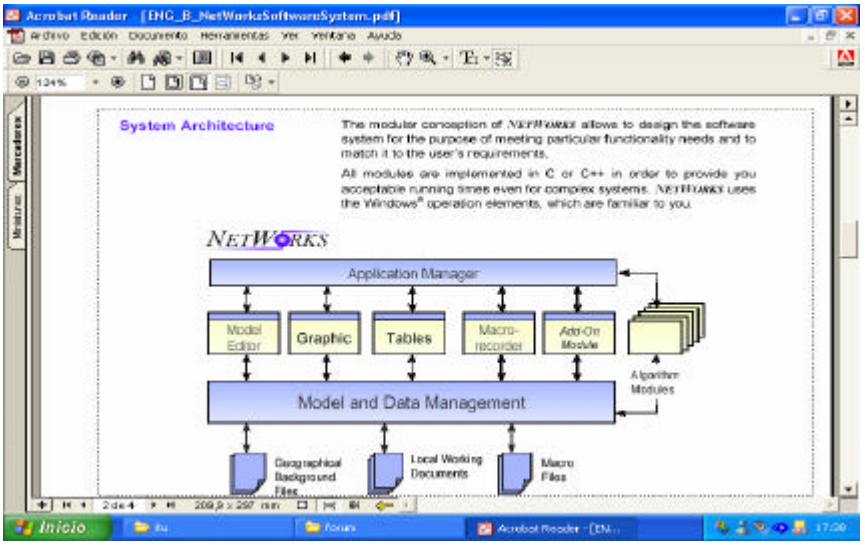
OPNET,COMNET, SCOOP, RNO,

Network Planning Tools: NetWORKS

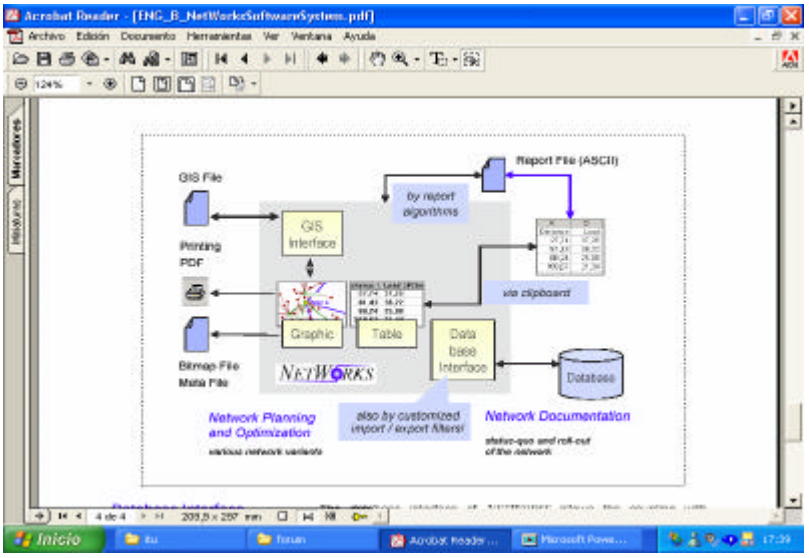
Telecom Network Planning

Objective : NetWORKS is a Telecom network planning tool to design, optimize and dimension several network layers as: Switching, Transmission, Cable, Mobile, etc.

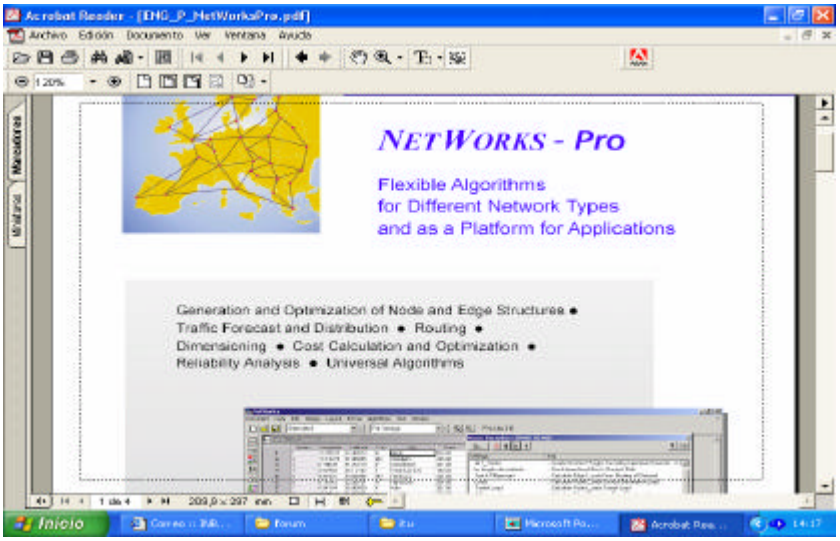
Network Planning Tools: NetWORKS



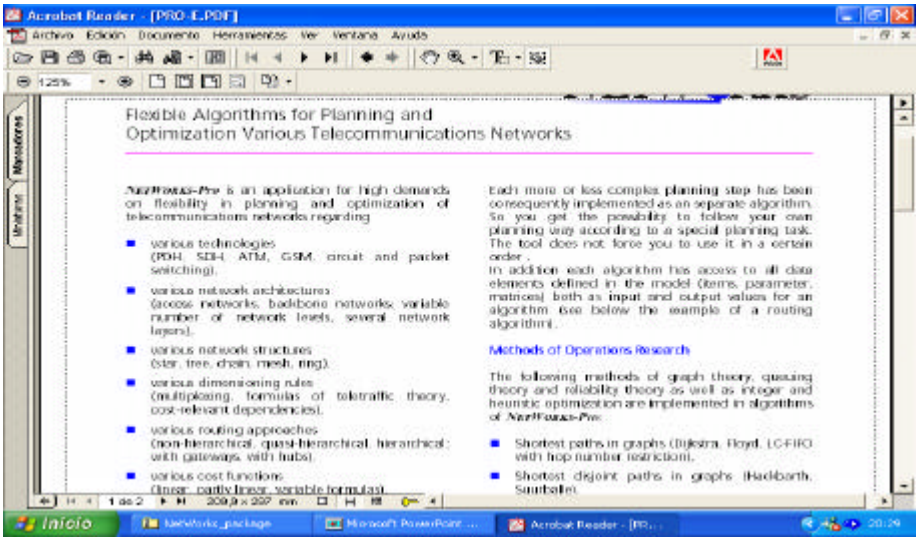
Network Planning Tools: NetWORKS



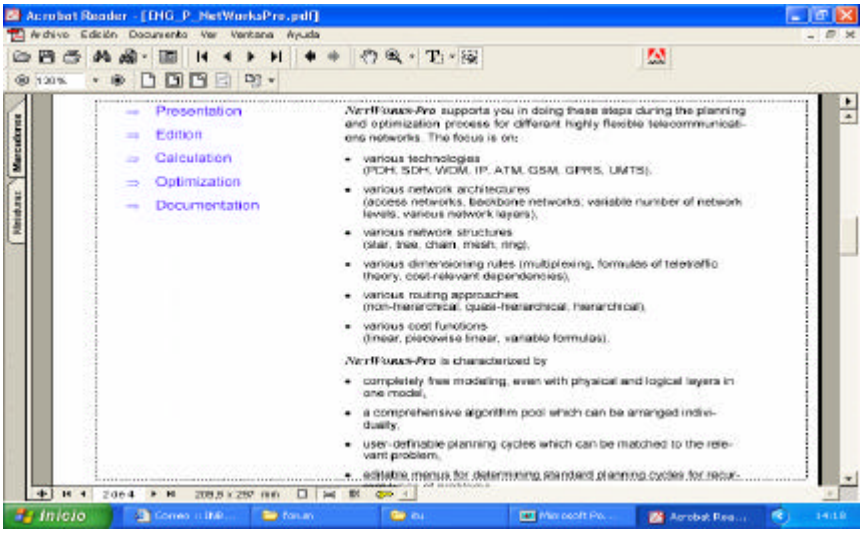
Network Planning Tools: NetWORKS



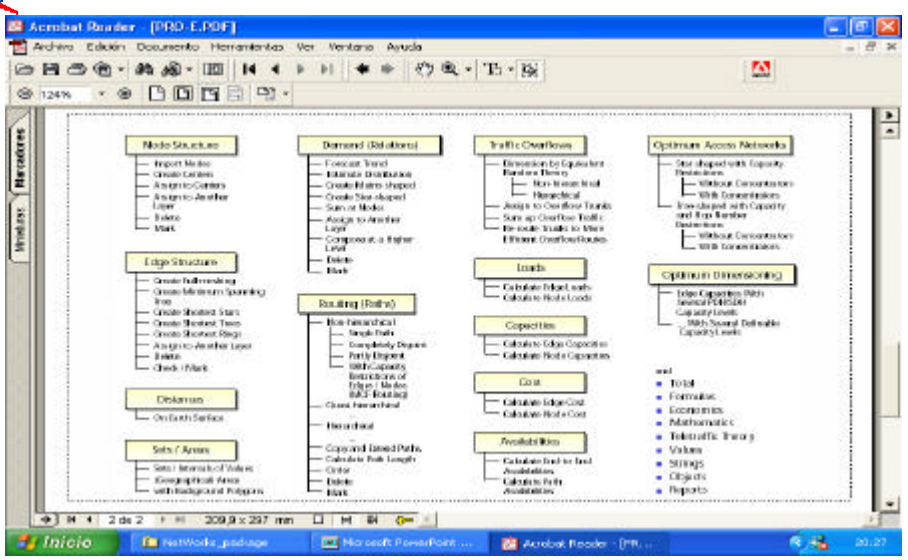
Network Planning Tools: NetWORKS



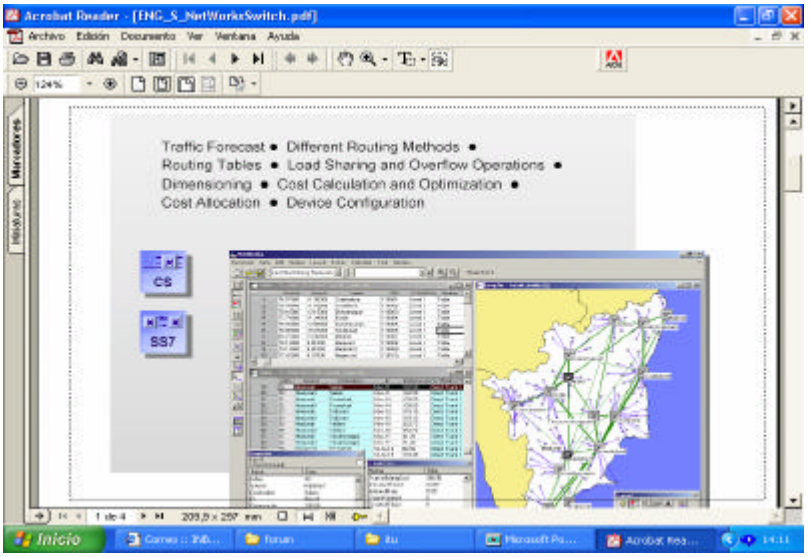
Network Planning Tools: NetWORKS



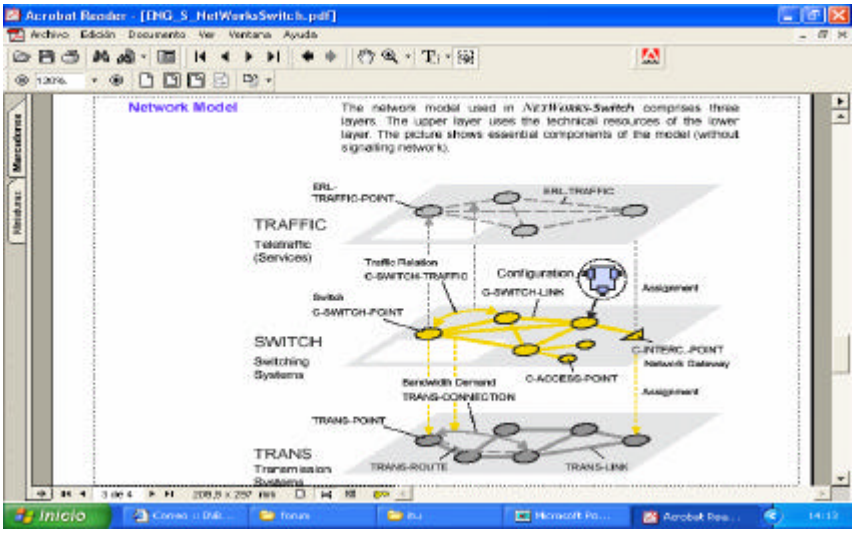
Network Planning Tools: NetWORKS



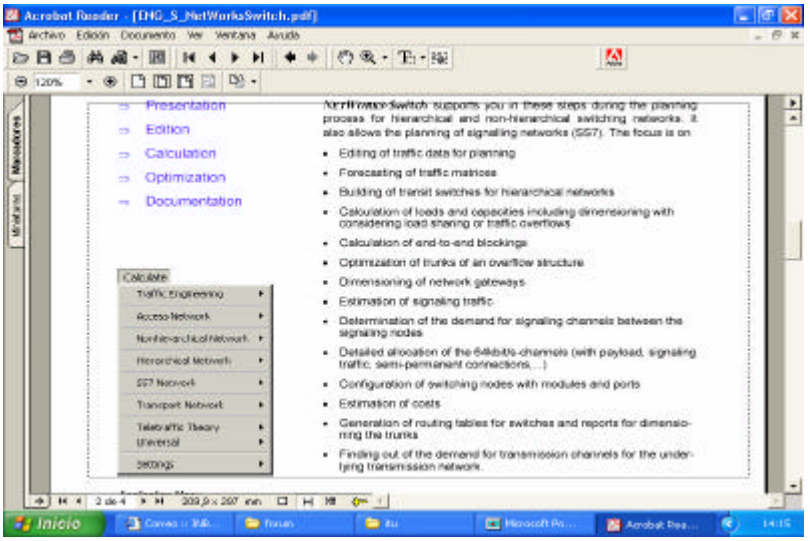
Network Planning Tools: NetWORKS



Network Planning Tools: NetWORKS



Network Planning Tools: NetWORKS



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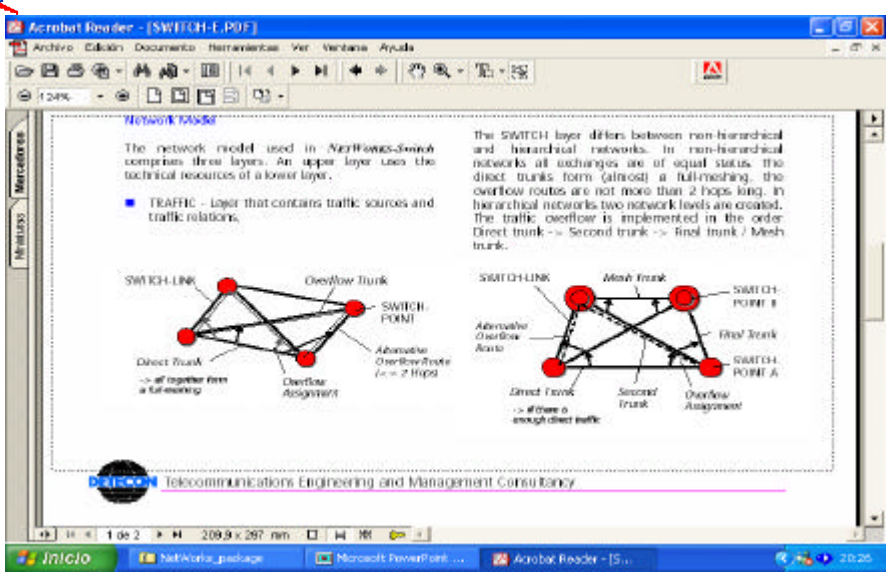

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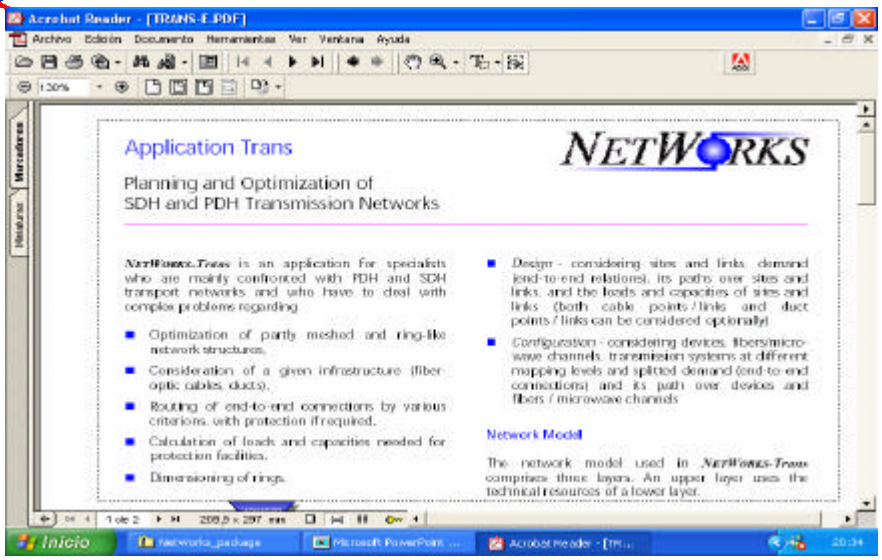

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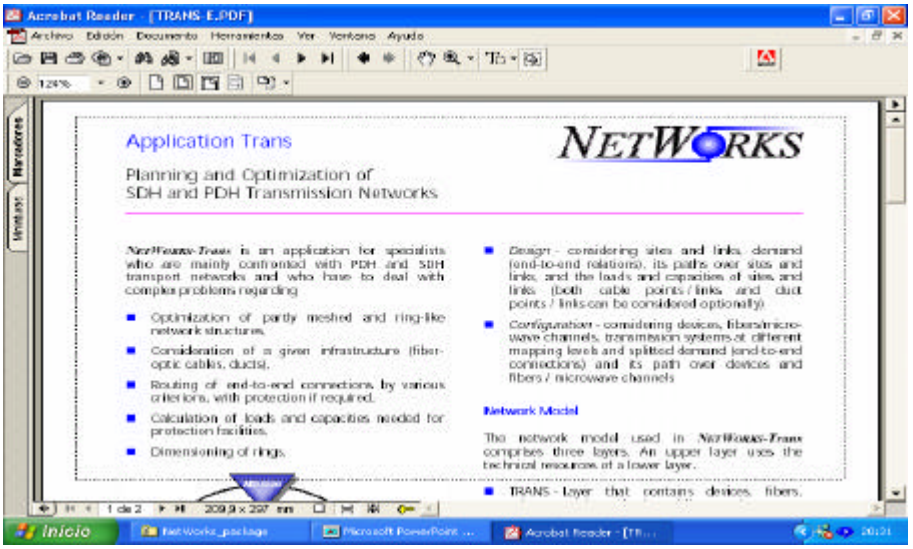

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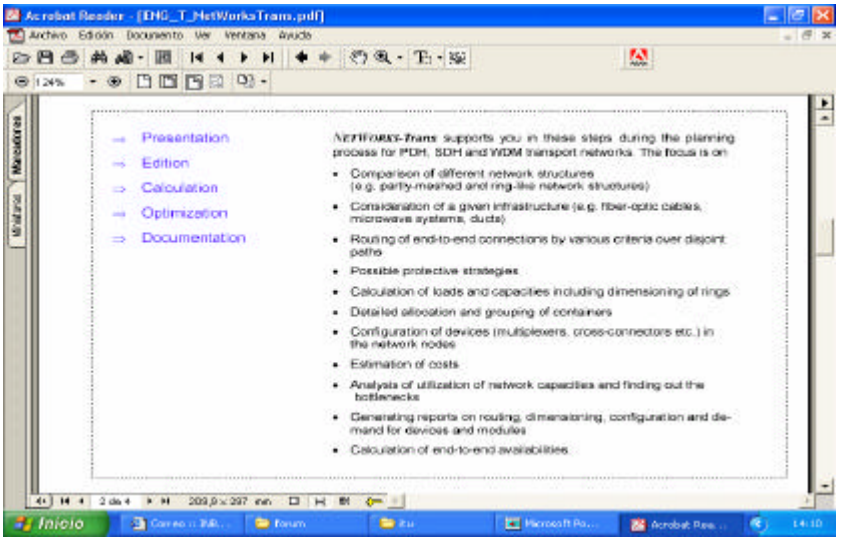

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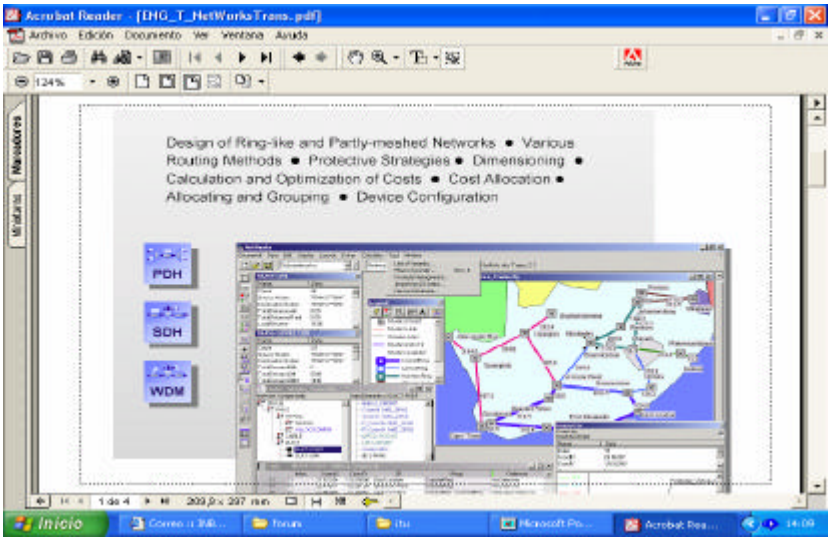

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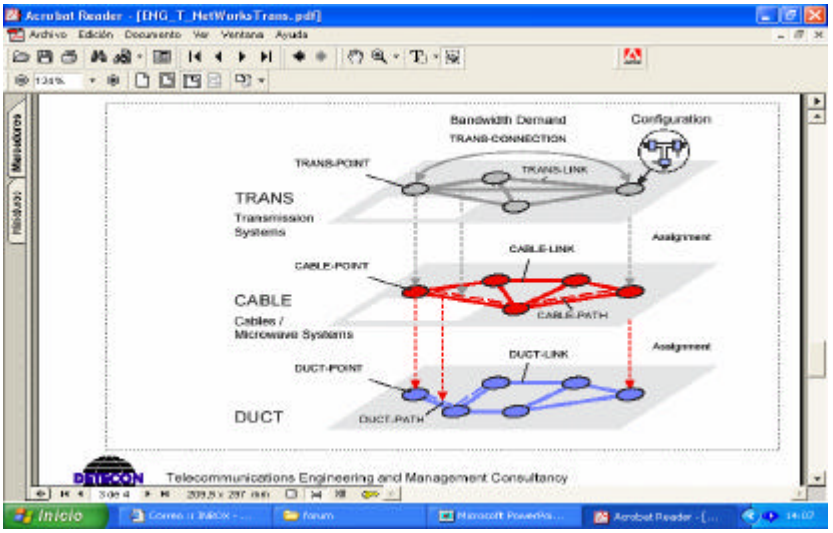

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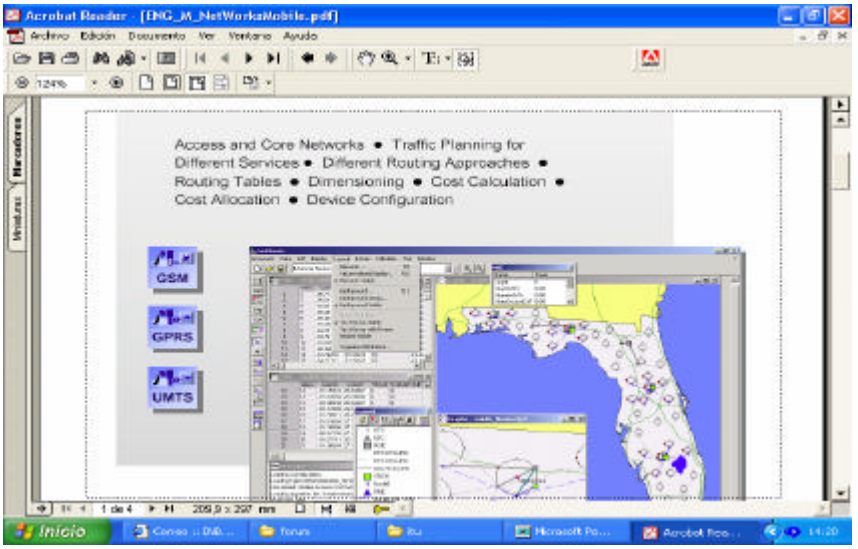

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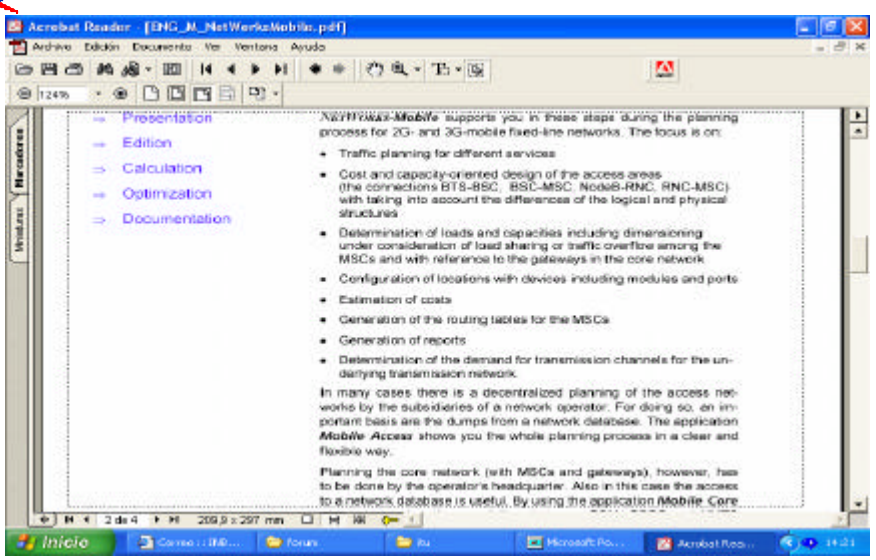

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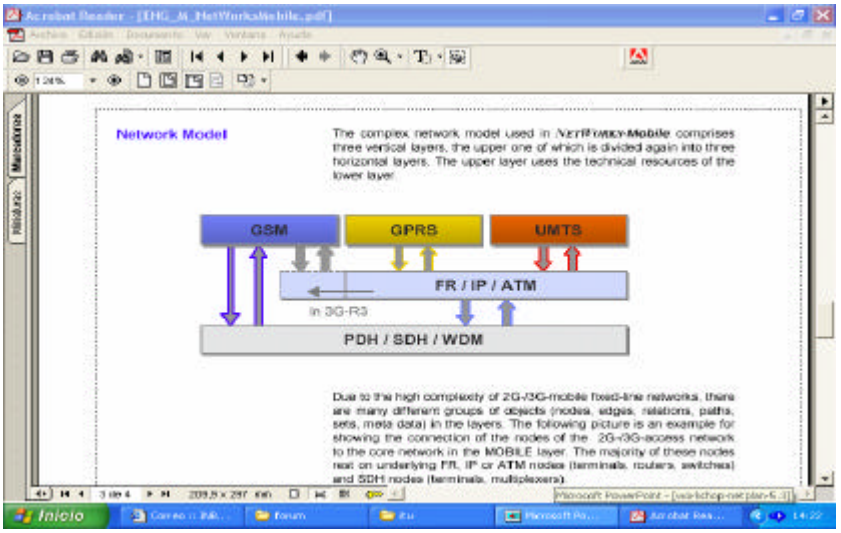

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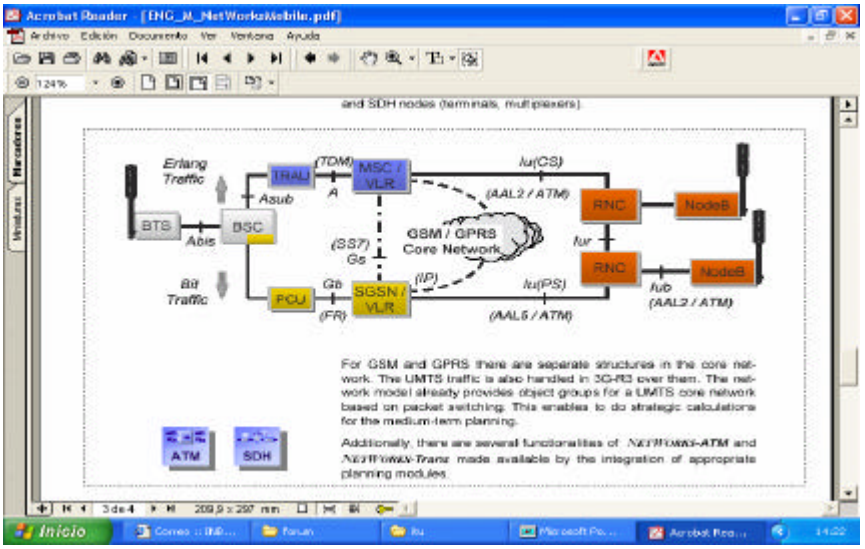

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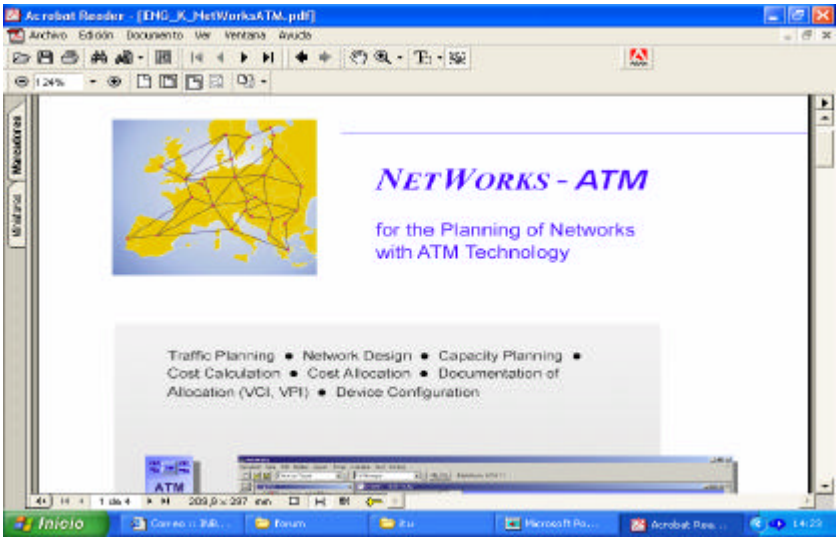

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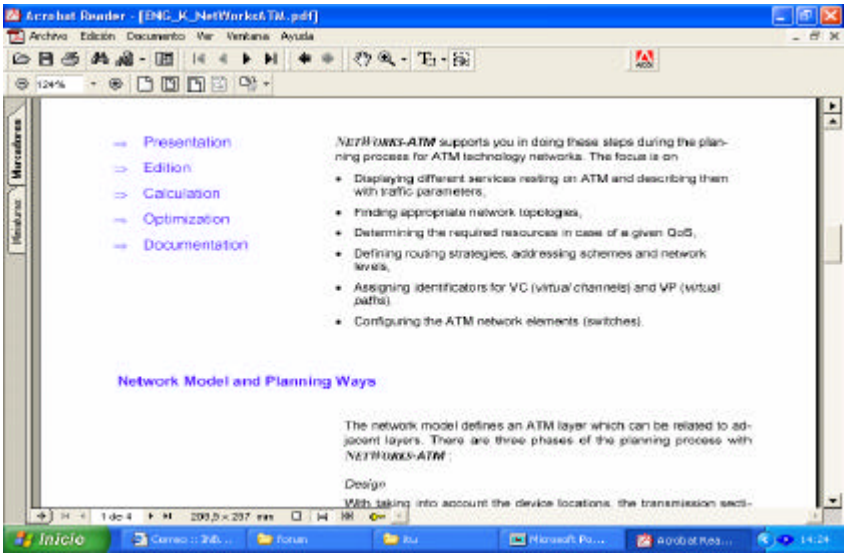
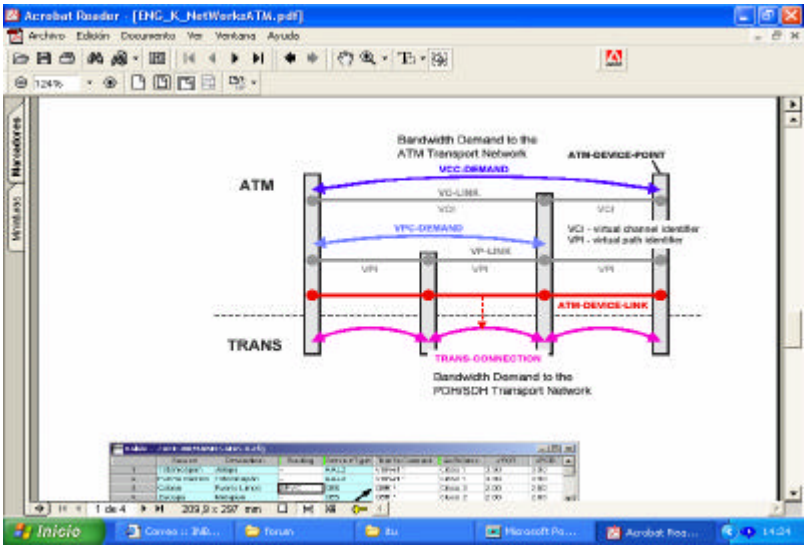
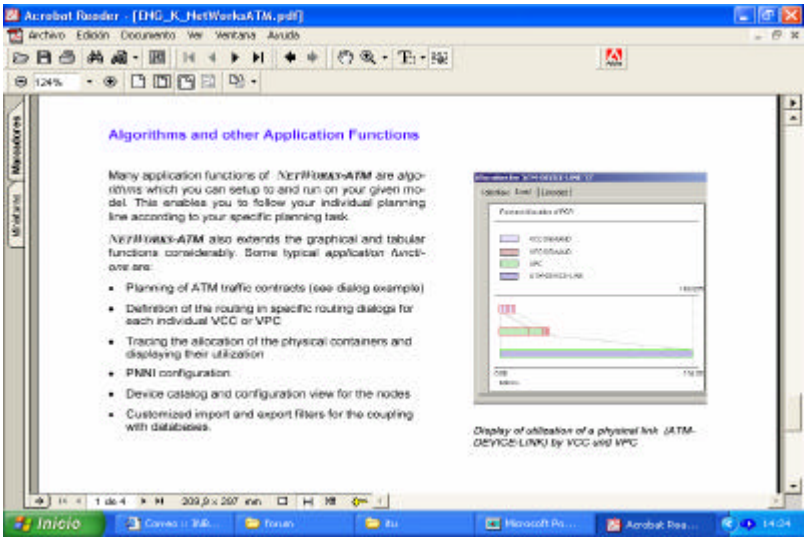


Network Planning Tools: NetWORKS



Network Planning Tools: NetWORKS



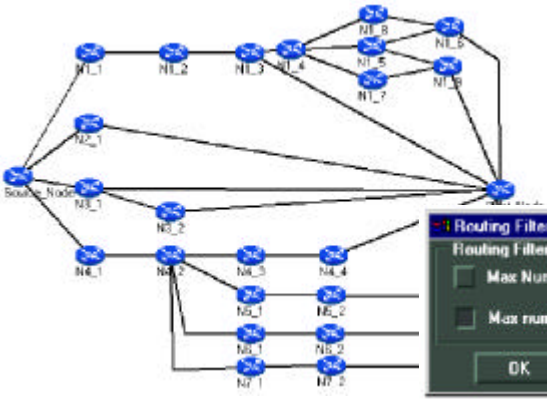
Network Planning Tools: NetQuad

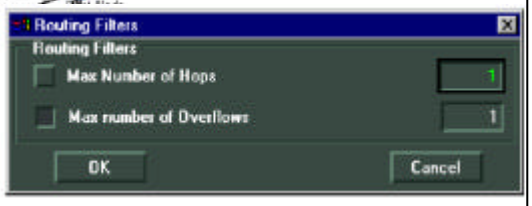
Telecom Network Planning

Objective : NetQuad is a Telecom network planning tool to design, optimize and dimension several network layers as: PSTN, Transmission, ATM, IP

Network Planning Tools: NetQuad Telephony

- Local/transit exchanges
- Traffic point to point (import for more complex affinity method)
- Routing can be computed or forced





Network Planning Tools: NetQuad Telephony Results

Routing Table

Node Name	Traffic Source	Traffic Destination	Route Number	Traffic Type	Next Node Name	Share	Next Node Name	Share	Next Node Name	Share
Source_Node	Source_Node	Dest_Node	T1	1	N2_1	0.50	N3_1	0.50		
Source_Node	Source_Node	Dest_Node	T1	2	N1_1	1.00				
N1_1	Source_Node	Dest_Node	T1	1	N1_2	1.00				
N1_2	Source_Node	Dest_Node	T1	1	N1_3	1.00				
N2_1	Dest_Node	Source_Node	T1	1	Source_Node	1.00				
N2_1	Source_Node	Dest_Node	T1	1	Dest_Node	1.00				
N3_1	Dest_Node	Source_Node	T1	1	Source_Node	1.00				
N3_1	Source_Node	Dest_Node	T1	1	Dest_Node	1.00				
N3_1	Source_Node	Dest_Node	T1	2	N3_2	1.00				
N3_2	Dest_Node	Source_Node	T1	1	N3_1	1.00				
N3_2	Source_Node	Dest_Node	T1	1	Dest_Node	1.00				
N1_3	Source_Node	Dest_Node	T1	1	Dest_Node	1.00				
N1_3	Source_Node	Dest_Node	T1	2	N1_4	1.00				
N1_4	Source_Node	Dest_Node	T1	1	N1_3	1.00				
N1_4	Source_Node	Dest_Node	T1	2	N1_5	0.33	N1_8	0.33	N1_7	0.33
N1_8	Source_Node	Dest_Node	T1	1	N1_6	1.00				
N1_5	Source_Node	Dest_Node	T1	1	N1_6	0.50	N1_9	0.50		
N1_7	Source_Node	Dest_Node	T1	1	N1_9	1.00				
N1_6	Source_Node	Dest_Node	T1	1	Dest_Node	1.00				

- Lists for routes
  - Load-sharing
  - Overflow...

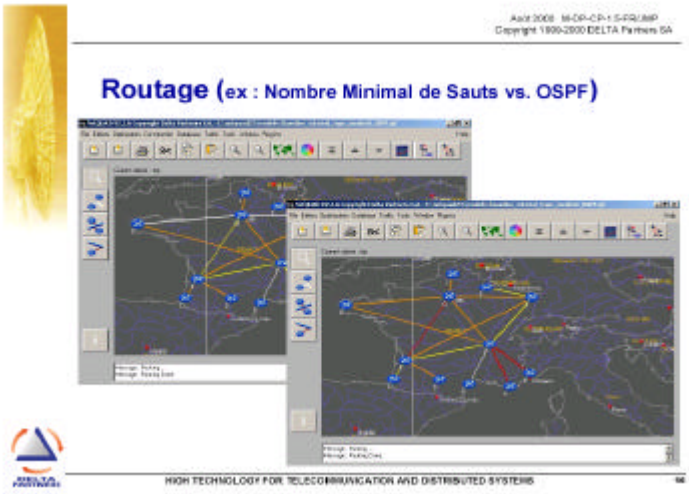
Network Planning Tools: NetQuad Telephony Results

- PCM can be 24,30 or 31 circuits size
- Cartographic view with colours
- End to end loss as a result
- No failure simulation available

Trunk's sizing report

Source.Site	Source.Node	Dest.Site	Dest.Node	Trunk	Min.Number.of.Circuits	Number.of.Circuits
top	Source_Node	top	N1_1	Source_Node_N1_1	0	0
top	Source_Node	top	N2_1	Source_Node_N2_1	42	62
top	Source_Node	top	N3_1	Source_Node_N3_1	42	62
top	Source_Node	top	N4_1	Source_Node_N4_1	0	0
top	N1_1	top	N1_2	N1_1_N1_2	0	0
top	N1_2	top	N1_3	N1_2_N1_3	0	0
top	N2_1	top	Dest_Node	N2_1_Dest_Node	42	62
top	N3_1	top	N3_2	N3_1_N3_2	0	0
top	N3_1	top	Dest_Node	N3_1_Dest_Node	42	62
top	N4_1	top	N4_2	N4_1_N4_2	0	0

Network Planning Tools: NetQuad IP



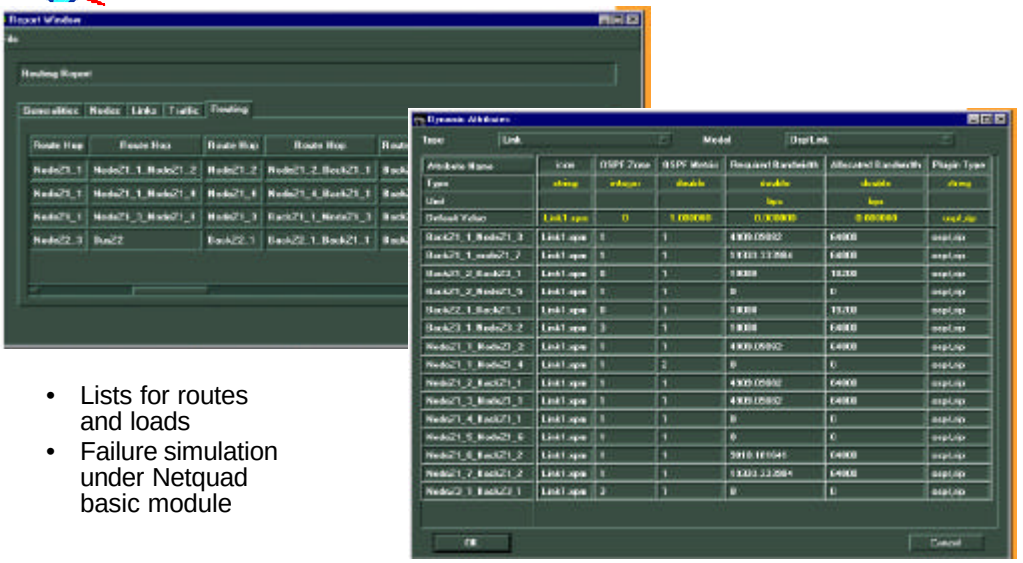
Network Planning Tools: NetQuad IP

- Nodes types and links can be declared as fixed or can be changed on bandwidth needs
- Equipment library to be done

Network Planning Tools: NetQuad IP

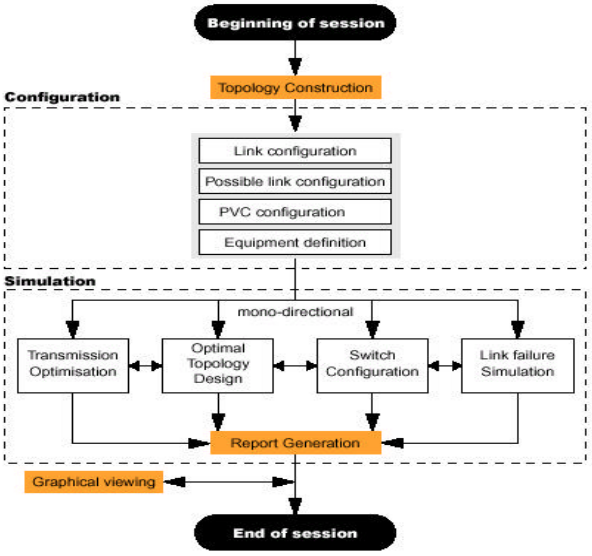
- Traffic input
  - Only one data can be introduced and generalised
  - Imply high memory capacity for storage and computing

Network Planning Tools: NetQuad IP Results



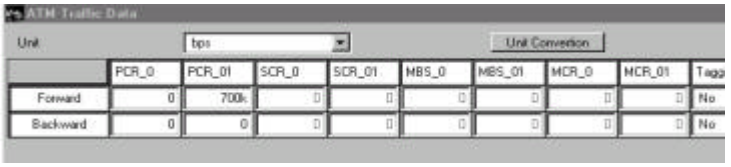
- Lists for routes and loads
- Failure simulation under Netquad basic module

Network Planning Tools: NetQuad ATM

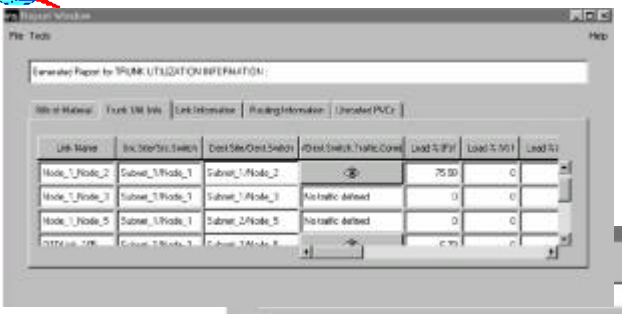


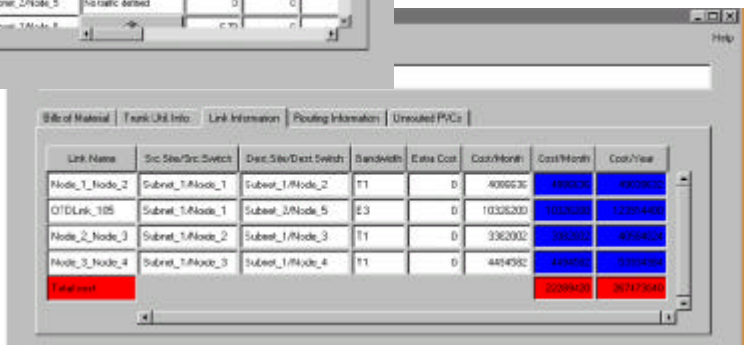
Network Planning Tools: NetQuad ATM

- Traffic per PVC basis can include PCR, SCR, UBR types…
- Equipment library to be done



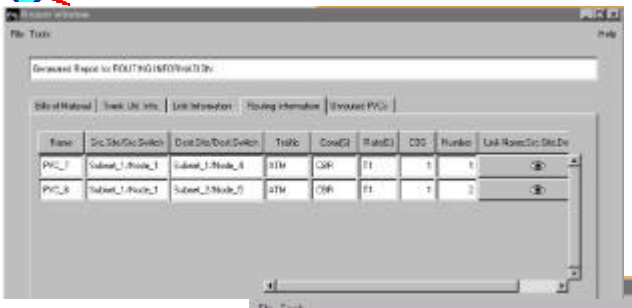
Network Planning Tools: NetQuad ATM Results

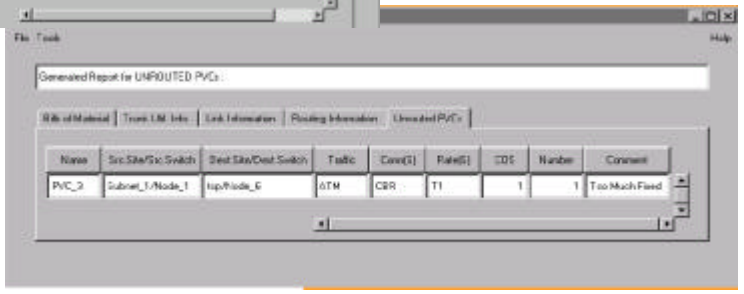




- Trunk utilisation and price

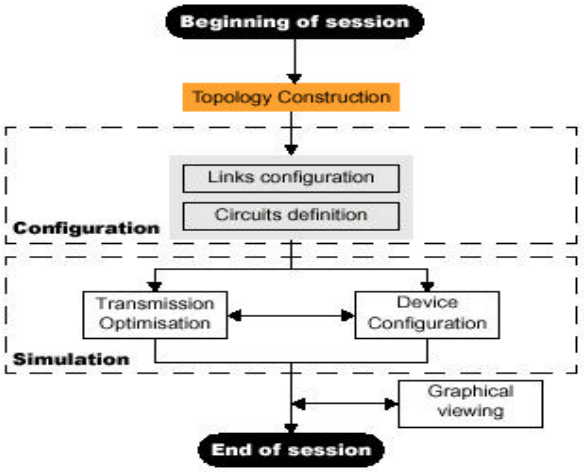
Network Planning Tools: NetQuad ATM Results



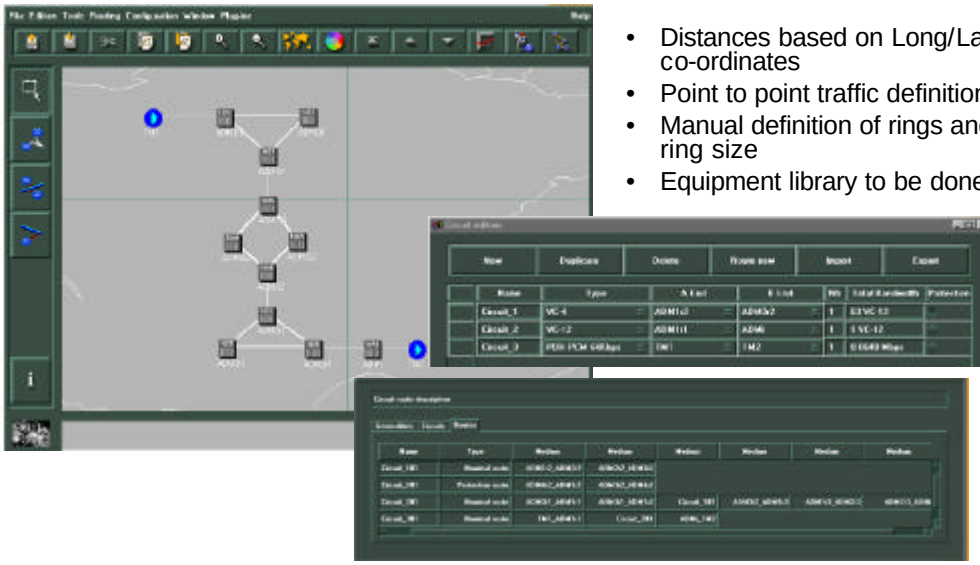


- Detailed routing or unrouted PVCs
  - New routing to be applied by the user or less constraint on the link size and node load
- Failure simulation available

Network Planning Tools: NetQuad SDH

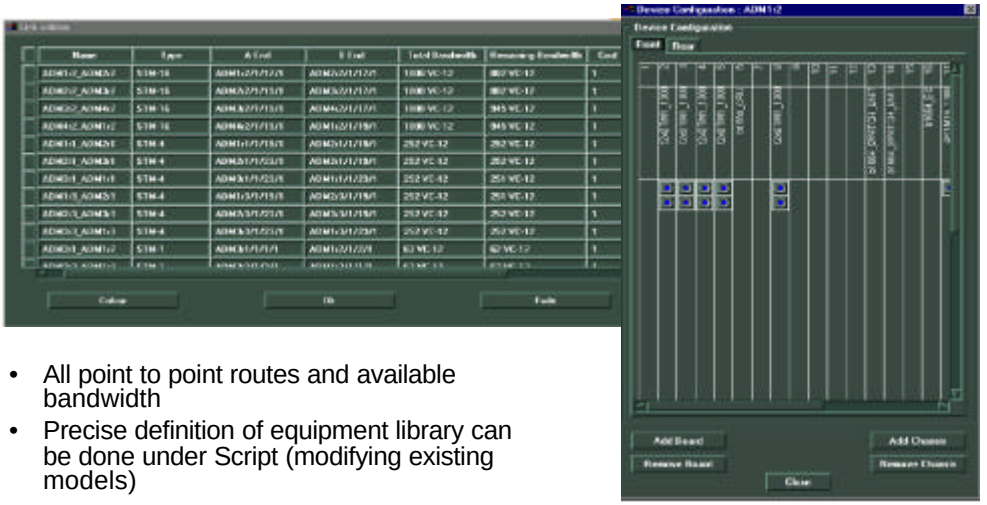


Network Planning Tools: NetQuad SDH



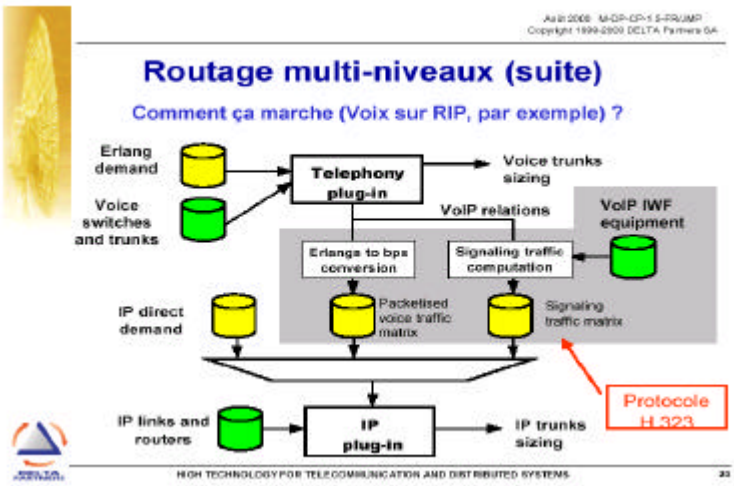
- Distances based on Long/Lat co-ordinates
- Point to point traffic definition
- Manual definition of rings and ring size
- Equipment library to be done

Network Planning Tools: NetQuad
SDH Results

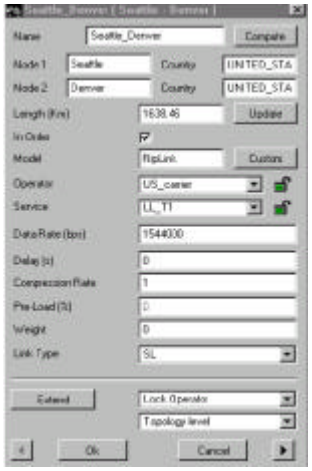


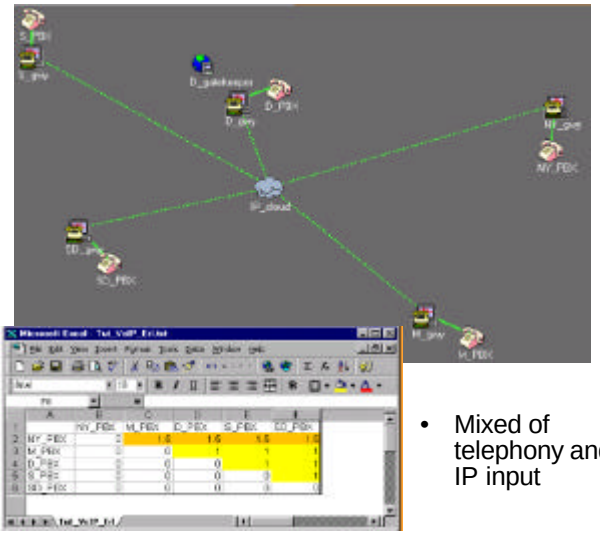
- All point to point routes and available bandwidth
- Precise definition of equipment library can be done under Script (modifying existing models)

Network Planning Tools: NetQuad
VoIP



Network Planning Tools: NetQuad VoIP

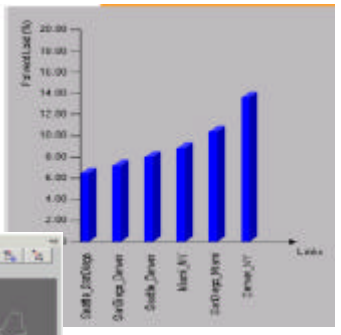


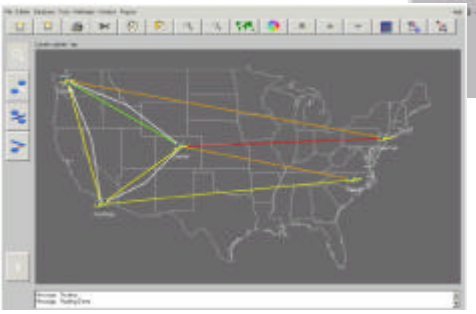


- Mixed of telephony and IP input

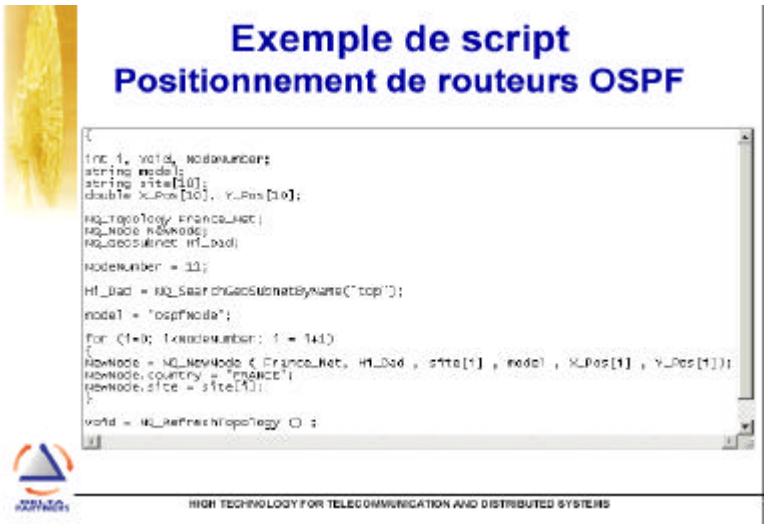
Network Planning Tools: NetQuad VoIP

- Mixed of results using IP routing laws



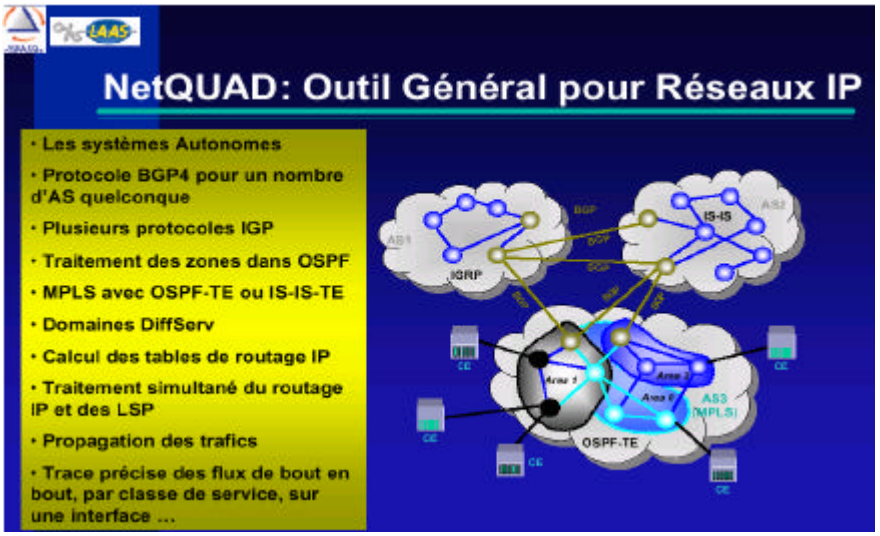


Network Planning Tools: NetQuad Script



- Based on C language
- Includes all attributes of the objects that can be found and enhanced in Netquad

Dimensioning tool Netquad MPLS Phase 1



Dimensioning tool
Netquad MPLS Phase 2