

Introduction to the software Net2plan

Romil Patel
(romilkumar@ua.pt)

Department of Electronics, Telecommunications and Informatics,
University of Aveiro, Aveiro, Portugal
Instituto de Telecomunicações, Aveiro, Portugal

INSTITUIÇÕES ASSOCIADAS:



INSTITUTO
SUPERIOR
TÉCNICO



Faculdade de Ciências
e Tecnologia da
Universidade de Coimbra



universidade
de aveiro



Inovação



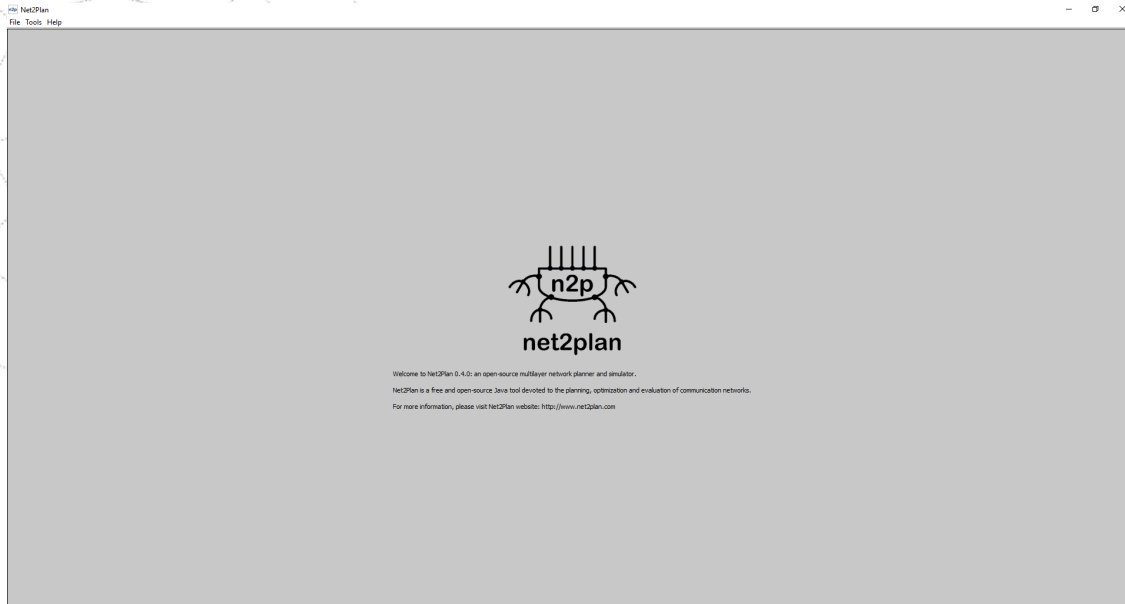
instituto de
telecomunicações

creating and sharing knowledge for telecommunications

©2005, it - instituto de telecomunicações

Net2Plan download and installation

- **Step 1** : Since Net2plan coded in Java, first step is to make sure that computer has necessary **Java Runtime Environment**. This can be downloaded from <https://java.com/en/download/> and install it in your computer.
- **Step 2** : Next download & install Net2plan software. Net2plan is available on <http://net2plan.com/download.php>.
 - There are several versions available on the website, however, please download a stable version "net2plan-0.4.2.zip".
 - Extract it and find the executable jar file with the name of "Net2Plan".
 - Double click on it and it'll open the following window (see next page):



Now we have Net2plan software installed in our computer !!!

INSTITUIÇÕES ASSOCIADAS:



Net2plan Tools

- **Creating Traffic Matrices :**

Step 1 : To start creating a traffic matrix in Net2Plan go to "Tools → Traffic matrix design" or press "Alt +2". This will pop-up the following window:

TRAFFIC MATRIX DESIGN

Traffic generation: general traffic modes
Select a traffic pattern: [v] [Apply this] [Apply batch]

Traffic generation: population-distance traffic model
Number of nodes: 4

Model parameters
☐ Euclidean distance (X, Y)
☐ Hyperbolic distance (m, lat)

Random factor: 0
Population offset: 0
Population power: 1
Distance offset: 0
Distance power: 1
Normalize by max. population? ☒
Normalize by max. distance? ☒

Topology information

| Id | Name | X | Y | Population | Level |
|----|--------|---|---|------------|-------|
| 0 | Node 0 | 0 | 0 | 250000 | 1 |
| 1 | Node 1 | 0 | 0 | 50000 | 1 |
| 2 | Node 2 | 0 | 0 | 250000 | 1 |
| 3 | Node 3 | 0 | 0 | 125000 | 1 |

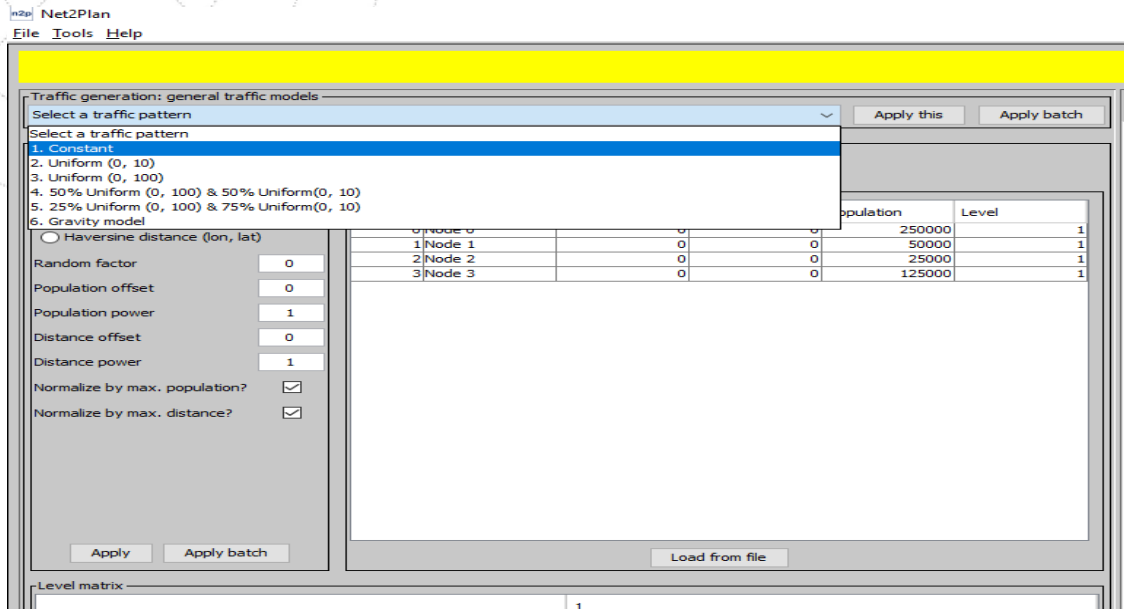
Apply [Apply batch] [Load from file]

Level matrix

| | 1 |
|---|---|
| 1 | 1 |

Traffic normalization
Select a normalization pattern: [v] [Apply] [Apply all]
Create a set of traffic matrices from a scenario one: [v] [Apply] [Apply all]
Select a model: [v]

- **Step 2 :** Click on the top left side "select a traffic pattern". This will open a palate which includes several types of option for traffic pattern. From these options, select "Constant" (see the following figure).



- **Step 3** : Next we'll create batch of matrices with constant traffic. for that click "Apply batch". This will pop-up a new box (see the figure) and fill all the value as per the following:

Number of nodes → 6

Number of matrices → 5

Constant value → 1

The screenshot shows the 'TRAFFIC MATRIX DESIGN' window. On the left, there is a table with columns 'Y', 'Population', and 'Level'. The table contains five rows of data. On the right, there is a 'TM 0' section with a table for 'Node 0' and 'Node 1'. Below the main window, a dialog box is open with the title 'Please enter the number of nodes and ma...'. The dialog box contains three input fields: 'Number of nodes' with the value '6', 'Number of matrices' with the value '5', and 'Constant value' with the value '1'. There are 'OK' and 'Cancel' buttons at the bottom of the dialog box.

| Y | Population | Level |
|---|------------|-------|
| 0 | 250000 | 1 |
| 0 | 500000 | 1 |
| 0 | 250000 | 1 |
| 0 | 1250000 | 1 |

| Node 0 | Node 1 |
|--------|--------|
| 0 | 0 |
| 0 | 0 |
| 0 | 0 |
| 0 | 0 |
| 0 | 0 |

TRAFFIC MATRIX DESIGN

TM 0

Node 0

Node 1

Node 2

Node 3

Total

Number of nodes: 6

Number of matrices: 5

Constant value: 1

OK Cancel

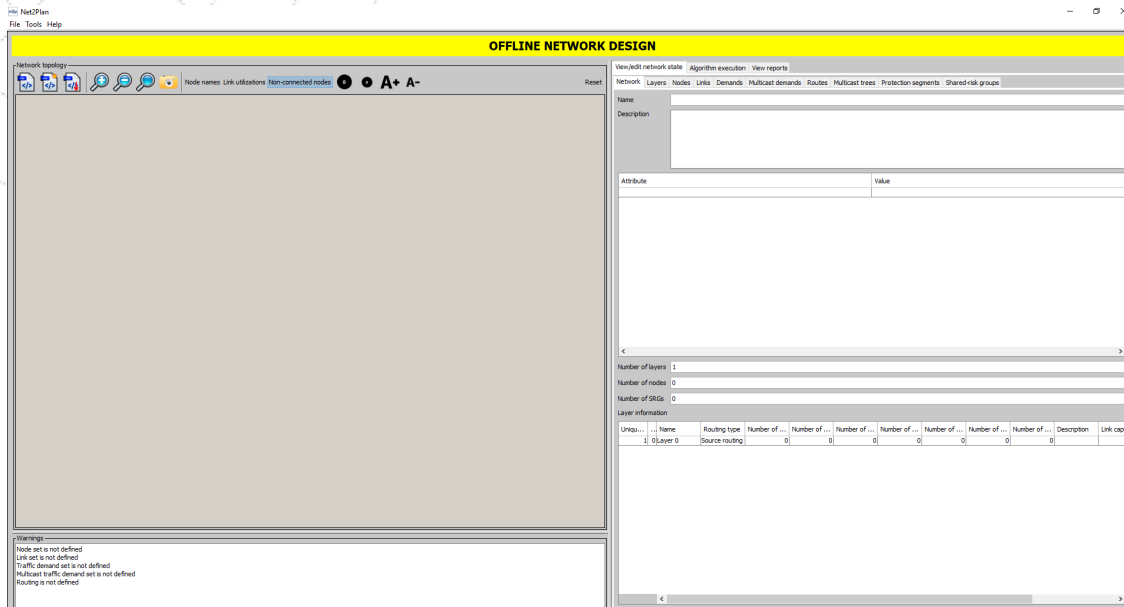
- **Step 4 :** This will create 5 different matrices. Now update the value of all the matrices according to your ODU matrices (To edit its value, double click on it).

Next click on "Save all" to save all these matrices.

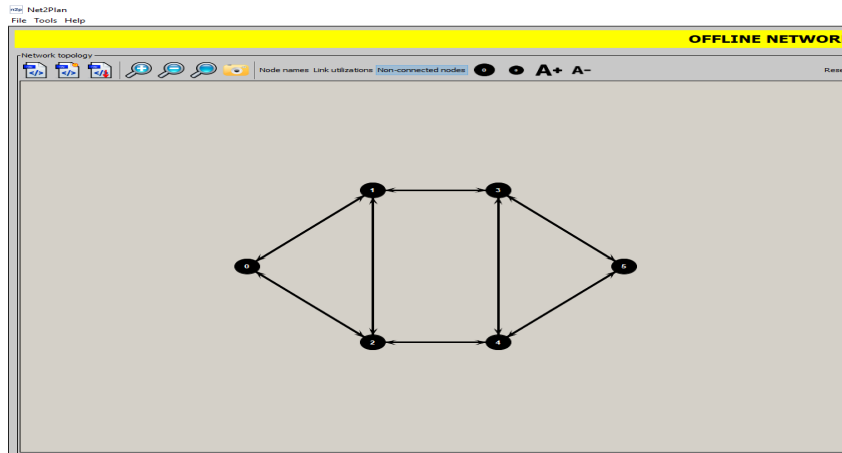
| TRAFFIC MATRIX DESIGN | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|-------|----|
| <div> <div> <div>Resize this</div> <div>Resize all</div> <div>Load</div> <div>Save this</div> <div>Save all</div> <div>Make symmetric this</div> <div>Make symmetric all</div> <div>Reset this</div> <div>Reset all</div> <div>Clear all</div> <div>Sum all</div> <div>Multiply this</div> <div>Multiply all</div> </div> </div> | | | | | | | | |
| <div> <div> <div>TM 0</div> <div>TM 1</div> <div>TM 2</div> <div>TM 3</div> <div>TM 4</div> <div>+</div> </div> </div> | | | | | | | | |
| | Node 0 | Node 1 | Node 2 | Node 3 | Node 4 | Node 5 | Total | |
| Node 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 5 |
| Node 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 5 |
| Node 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 5 |
| Node 3 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 5 |
| Node 4 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 5 |
| Node 5 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 5 |
| Total | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 30 |

- **Creating the Network topologies :**

Step 1 : To start the network creation in Net2plan go to "Tools → Offline network design" or press "Alt + 1". This will pop-up the following window:



- **Step 2 :** To start creating a new network, first nodes have to be introduced by right clicking on the gray area and choosing "Add node here".
- Links between nodes are created by holding a click on the origin node and dragging until the destination node, holding shift before releasing the click creates bidirectional links.
- Create a full network as shown in figure.



- **Step 3** : View/edit network states

It displays all the characteristics/states of our network. Modify it where where applicable (i.e. in "links", we can set the capacity of the each link.)

OFFLINE NETWORK DESIGN

View/edit network state | Algorithm execution | View reports

Network | Layers | Nodes | Links | Demands | Multicast demands | Routes | Multicast trees | Protection segments | Shared-risk groups

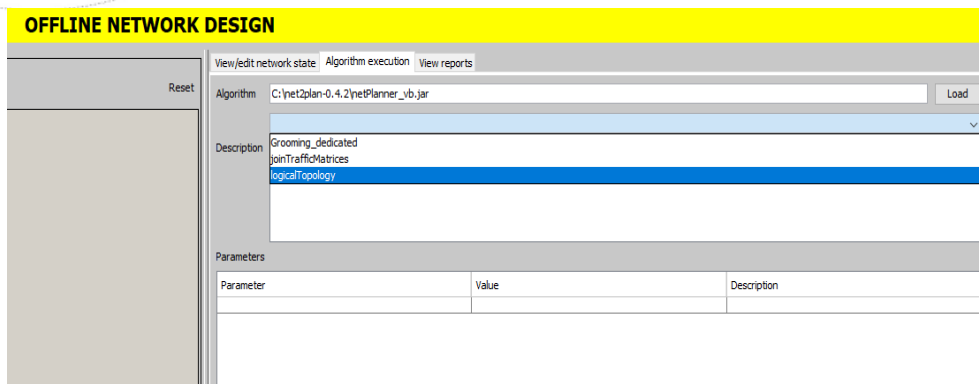
| Unique id... | Index | Show/hide | Origin node | Destination... | State | Capacity | Carried tra... | Reserved f... | Utilization | Utilization (...) | Is botter |
|--------------|-------|-----------|-------------|----------------|-------|----------|----------------|---------------|-------------|-------------------|-----------|
| 9 | 0 | | 2 (Node 3) | 1 (Node 4) | | 30 | 0 | 0 | 0 | 0 | |
| 10 | 1 | | 1 (Node 4) | 0 (Node 3) | | 30 | 0 | 0 | 0 | 0 | |
| 11 | 2 | | 1 (Node 4) | 3 (Node 6) | | 30 | 0 | 0 | 0 | 0 | |
| 12 | 3 | | 3 (Node 6) | 1 (Node 4) | | 30 | 0 | 0 | 0 | 0 | |
| 13 | 4 | | 3 (Node 6) | 5 (Node 8) | | 30 | 0 | 0 | 0 | 0 | |
| 14 | 5 | | 5 (Node 8) | 3 (Node 6) | | 30 | 0 | 0 | 0 | 0 | |
| 15 | 6 | | 5 (Node 8) | 4 (Node 7) | | 30 | 0 | 0 | 0 | 0 | |
| 16 | 7 | | 4 (Node 7) | 5 (Node 8) | | 30 | 0 | 0 | 0 | 0 | |
| 17 | 8 | | 4 (Node 7) | 2 (Node 5) | | 30 | 0 | 0 | 0 | 0 | |
| 18 | 9 | | 2 (Node 5) | 4 (Node 7) | | 30 | 0 | 0 | 0 | 0 | |
| 19 | 10 | | 2 (Node 5) | 0 (Node 3) | | 30 | 0 | 0 | 0 | 0 | |
| 20 | 11 | | 0 (Node 3) | 2 (Node 5) | | 30 | 0 | 0 | 0 | 0 | |
| 21 | 12 | | 2 (Node 5) | 1 (Node 4) | | 30 | 0 | 0 | 0 | 0 | |
| 22 | 13 | | 1 (Node 4) | 2 (Node 5) | | 30 | 0 | 0 | 0 | 0 | |
| 23 | 14 | | 4 (Node 7) | 3 (Node 6) | | 30 | 0 | 0 | 0 | 0 | |
| 24 | 15 | | 3 (Node 6) | 4 (Node 7) | | 30 | 0 | 0 | 0 | 0 | |

● **Step 4** : Algorithm execution

- Set the path of the algorithm (i.e. C:/Net2plan-0.4.2/NetPlanner_vb.jar).

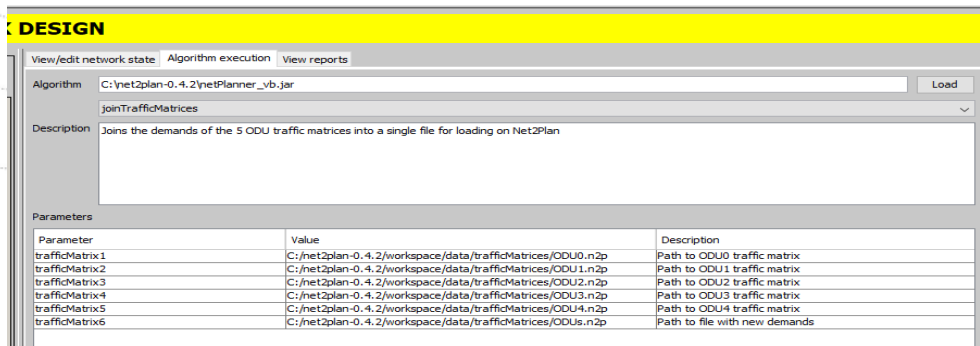
This includes three different algorithm :

1. joinTrafficMatrices
2. logicalTopology
2. Grooming_dedicated



- **Step 5 :** From the palate, first select "jonTrafficMatrices".

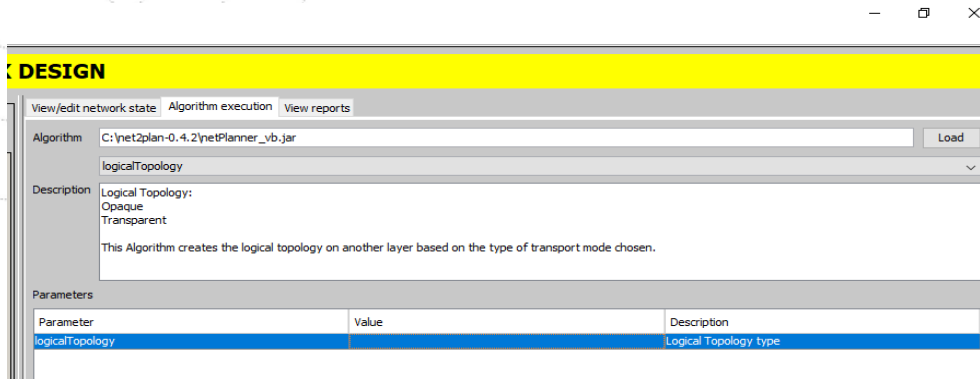
Now set the path of the all ODU matrices which we have created earlier.
(i.e. C:\net2plan-0.4.2\workspace\data\trafficMatrices\ODU0.n2p)



After setting all path of ODUs, click on the "Execute" buttons.

- **Step 6** : From the palate, select "logicalTopology".

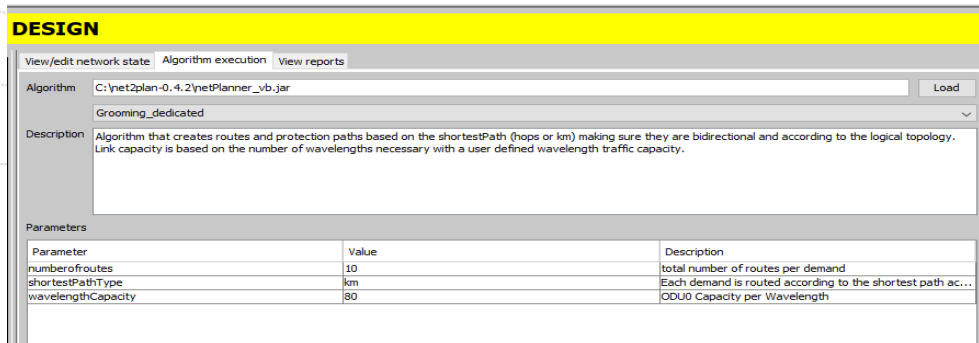
Read the description in the Net2plan to understand the function of the algorithm.



click on the "Execute" buttons.

- **Step 7** : From the palate, select "Grooming_dedicated".

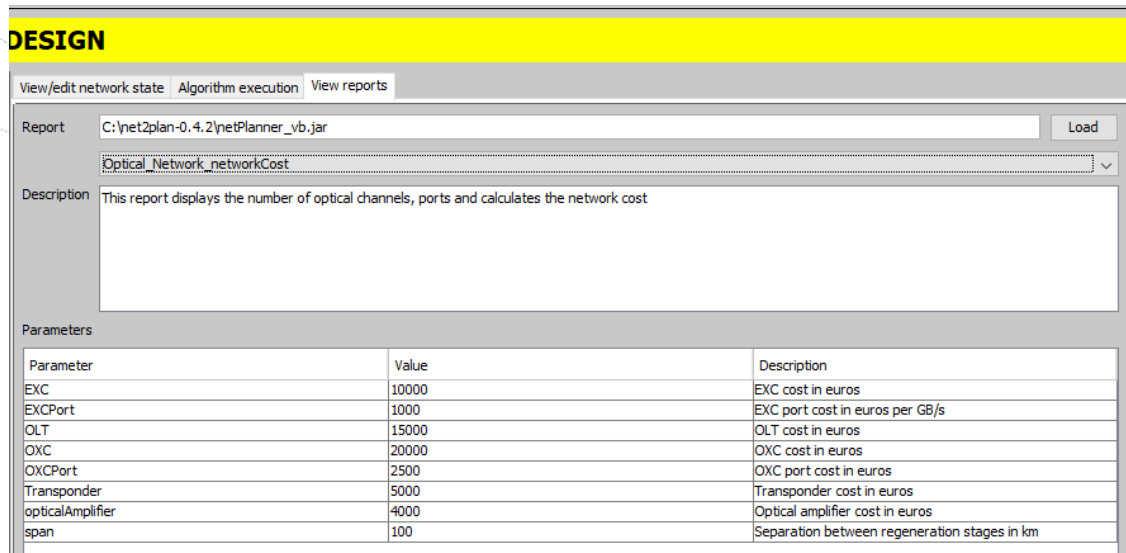
Read the description in the Net2plan to understand the function of the algorithm.



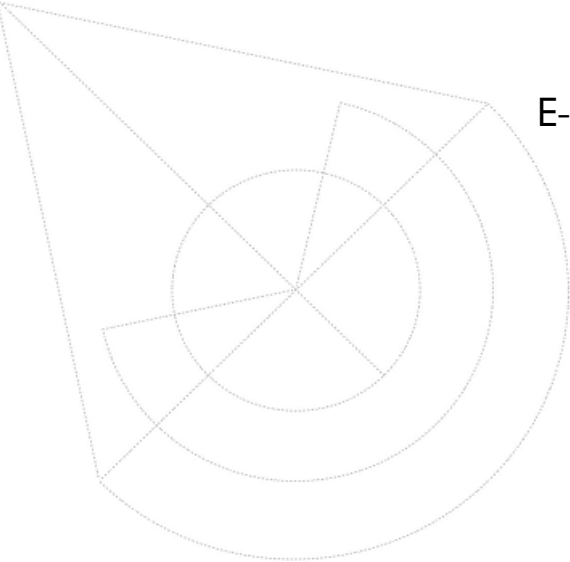
click on the "Execute" buttons.

- **View Reports :**

This section will generate a table which includes number of optical channels, ports and calculates the network cost.



| Parameter | Value | Description |
|------------------|-------|--|
| EXC | 10000 | EXC cost in euros |
| EXCPort | 1000 | EXC port cost in euros per GB/s |
| OLT | 15000 | OLT cost in euros |
| OXC | 20000 | OXC cost in euros |
| OXCPort | 2500 | OXC port cost in euros |
| Transponder | 5000 | Transponder cost in euros |
| opticalAmplifier | 4000 | Optical amplifier cost in euros |
| span | 100 | Separation between regeneration stages in km |



E-mail: romilkumar@ua.pt

INSTITUIÇÕES ASSOCIADAS:

