# CEMC606: Industrial Networks

## Lecture 5: Wireless LAN Networks-2

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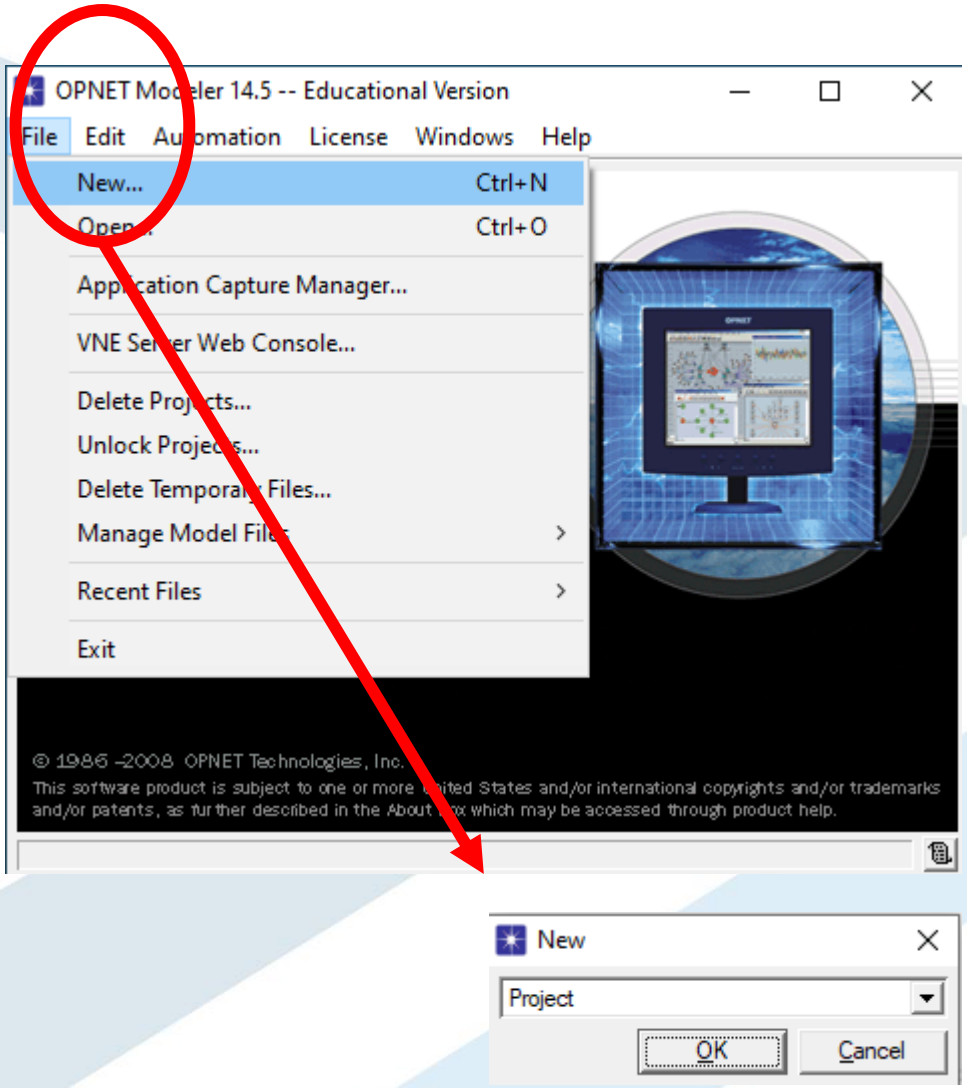
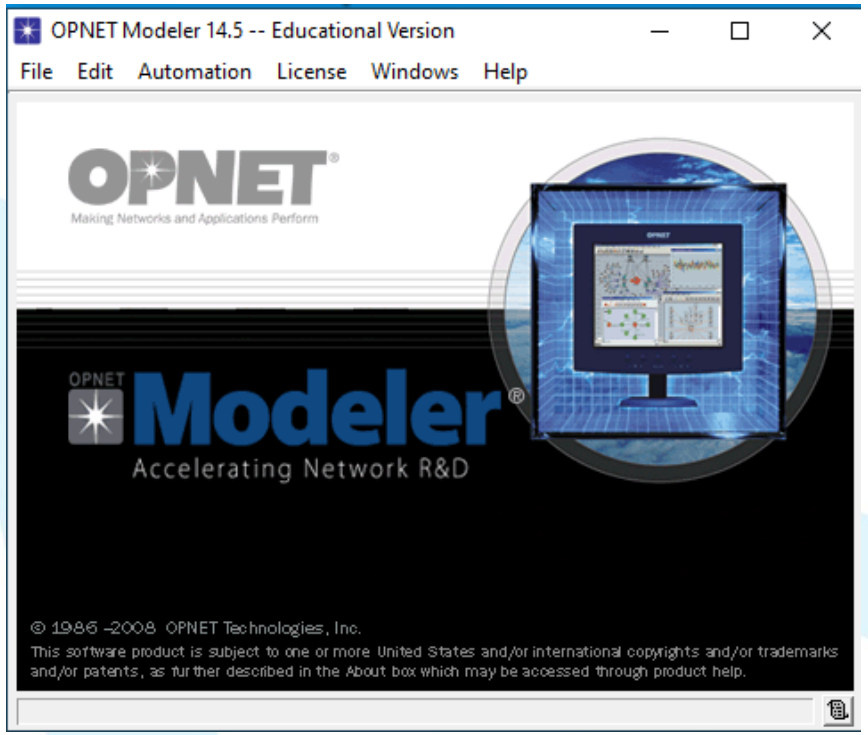
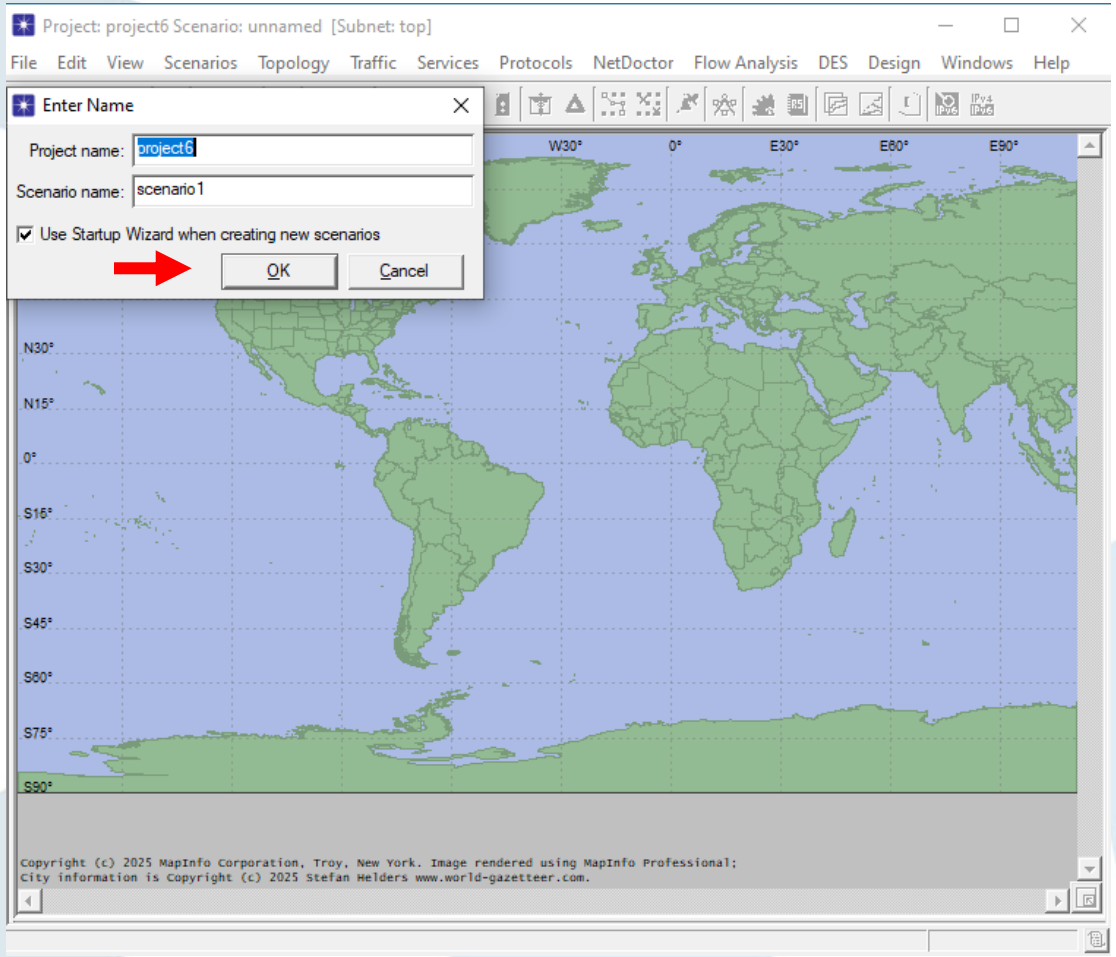
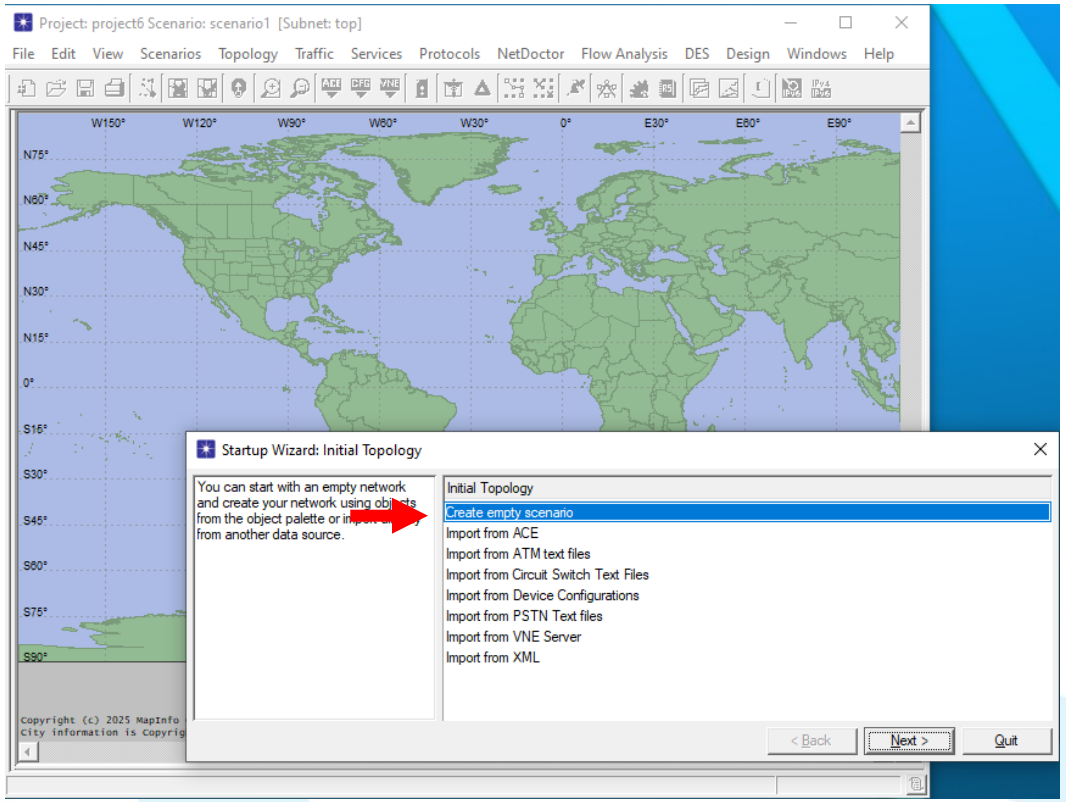
بداية نبدأ بفتح واجهة البرنامج الأساسية لإنشاء ملف جديد فتكون كما يلي

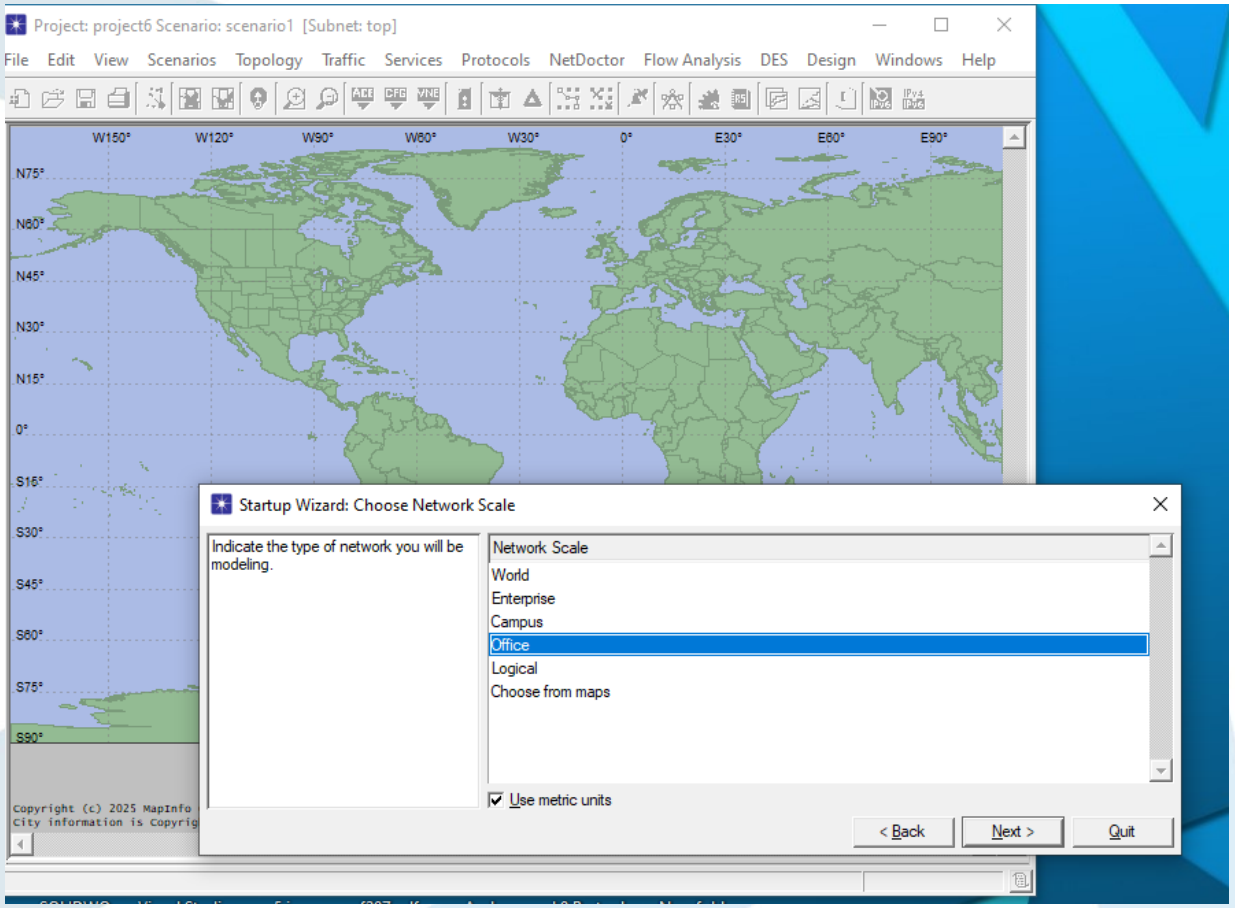


نقوم بإنشاء مشروع جديد ثم نختار إنشاء سيناريو فارغ لتوصيف مسألة العمل بداخلها






بعدها نختار حجم المكان الذي تمتد عليه الشبكة وفي حالتنا سنعمل على مساحة مكتب

# تمرين – تحليل أداء الشبكات اللاسلكية

قم بإنشاء شبكة لاسلكية محلية تمتد على مساحة جغرافية 120 متر على المحور x و 110 مترعلى المحور y بحيث تتكون الشبكة من 10 حواسيب مع الأخذ بعين الاعتبار التوصيلات بين السيرفر و نقطة الوصول و السويتش مع العلم أن الكابلات من نوع كابلات محورية. والشبكة المحلية تعمل على المعيار g802.11.

مؤلفة من 10 مستخدمين، نفعل لكل المستخدمين في الشبكة التطبيق Conferencing Videoيتم بنقل الفيديو باستخدام معدل نقل 6Mbps

البارمترات التي سوف يتم دراستها هي كالتالي:

- التأخير End - to – End Delay(sec).
- المعلومات المرسلة Traffic Sent(bytes/sec).

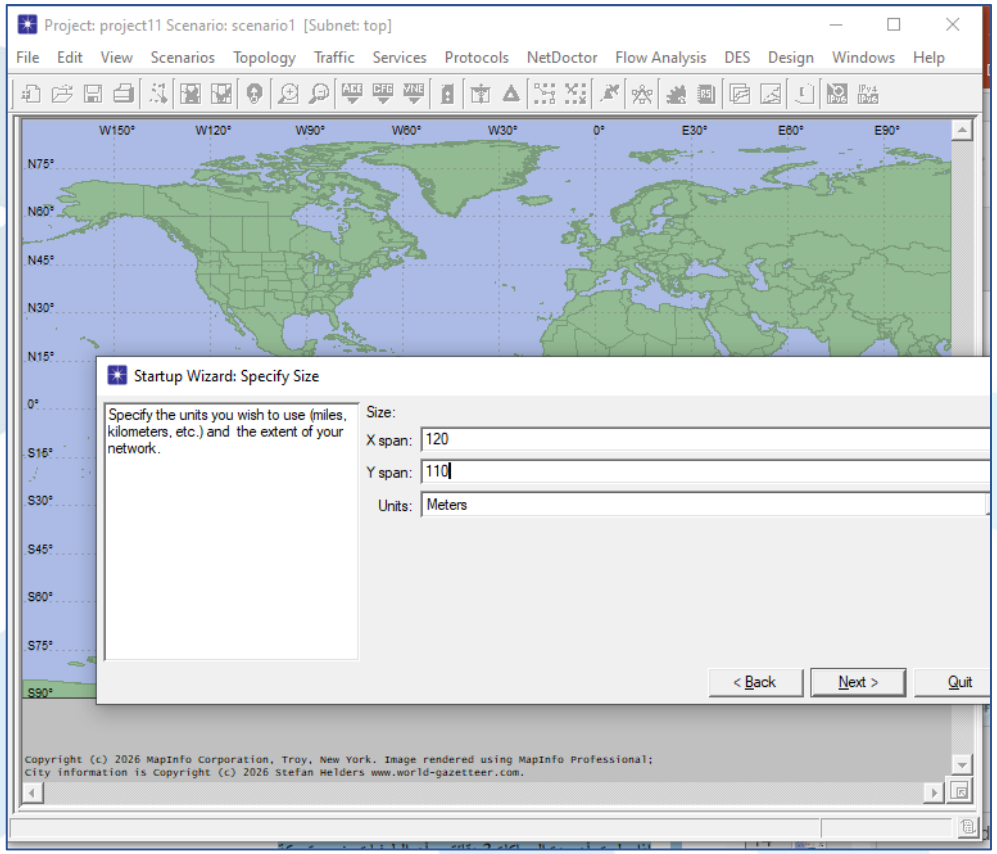
المعلومات المستقبلة Traffic Received (bytes/sec)

وناقش ما يلي:

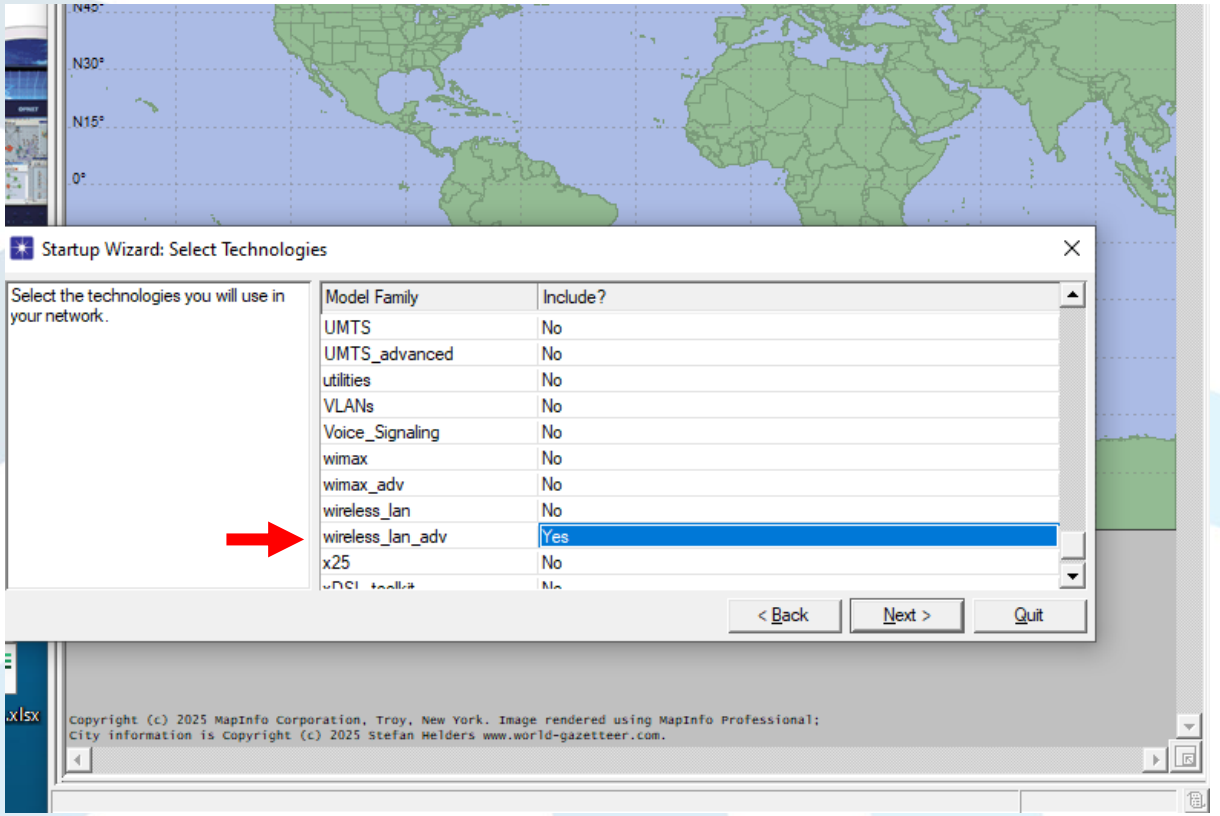
قارن بين المعطيات المرسلة والمعطيات المستقبلة هل يحصل ضياع ولماذا؟

بالنظر للتأخير ماذا تستنتج؟ - إذا علمت أن مدة المحاكاة دقيقتين ونصف، وأن الطرفيات غير متحركة.

# المساحة التي تتوزع عليها شبكة المكتب



# اختيار تكنولوجيا النقل wireless_lan_adv



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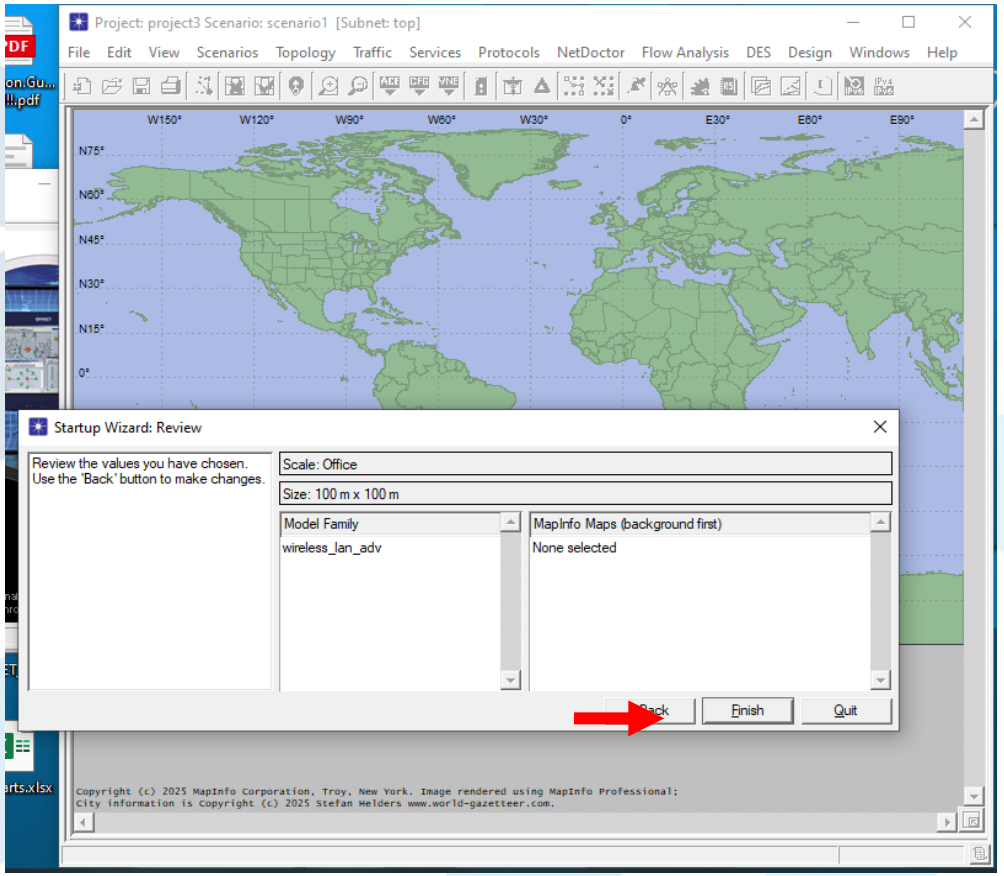
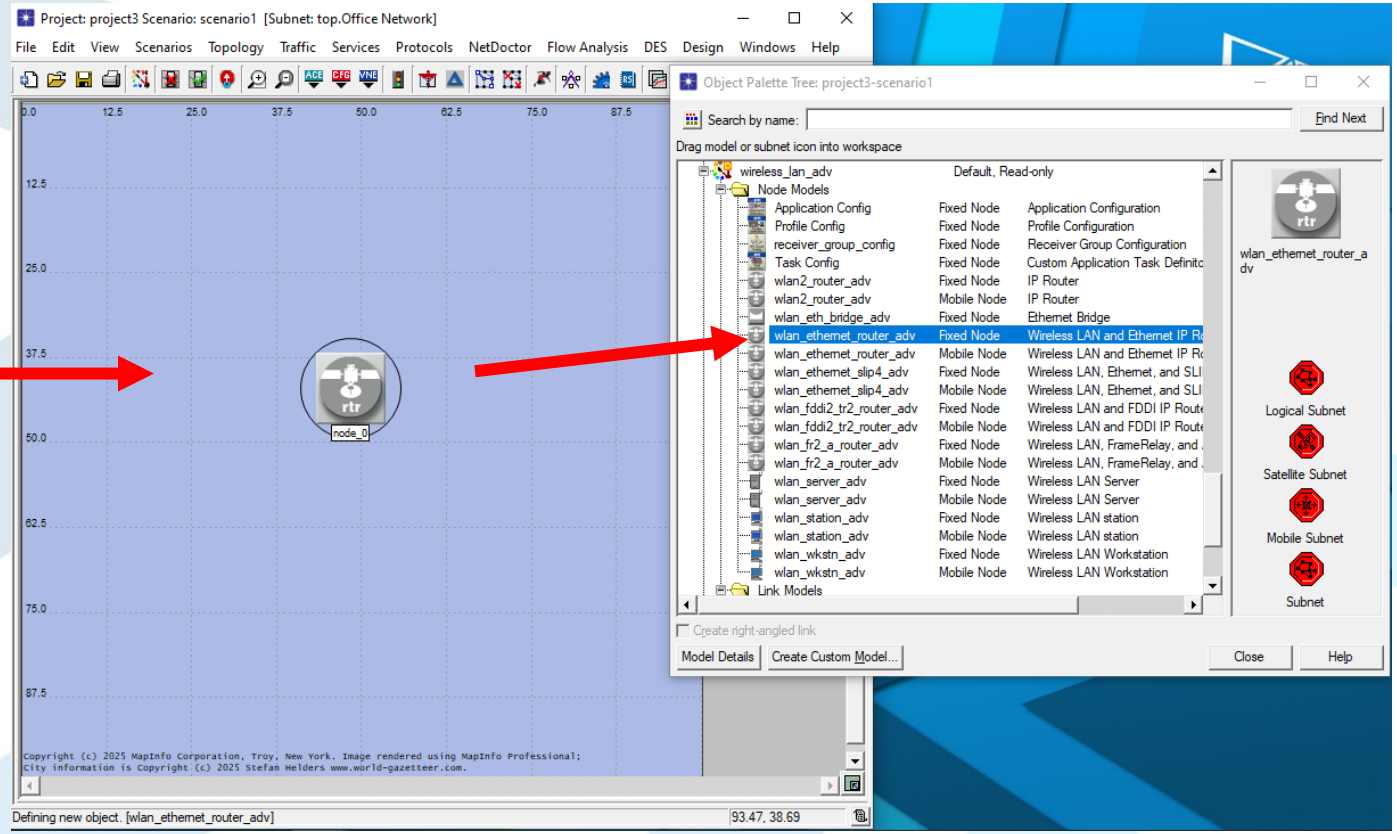
# إنهاء إعداد بيانات الشبكة الأساسية



# مساحة العمل الأساسية لبدء تصميم الشبكة مع شجرة العناصر

نقطة الوصول router



نضع معرفات الشبكة وتجهيزاتها المرغوبة هنا

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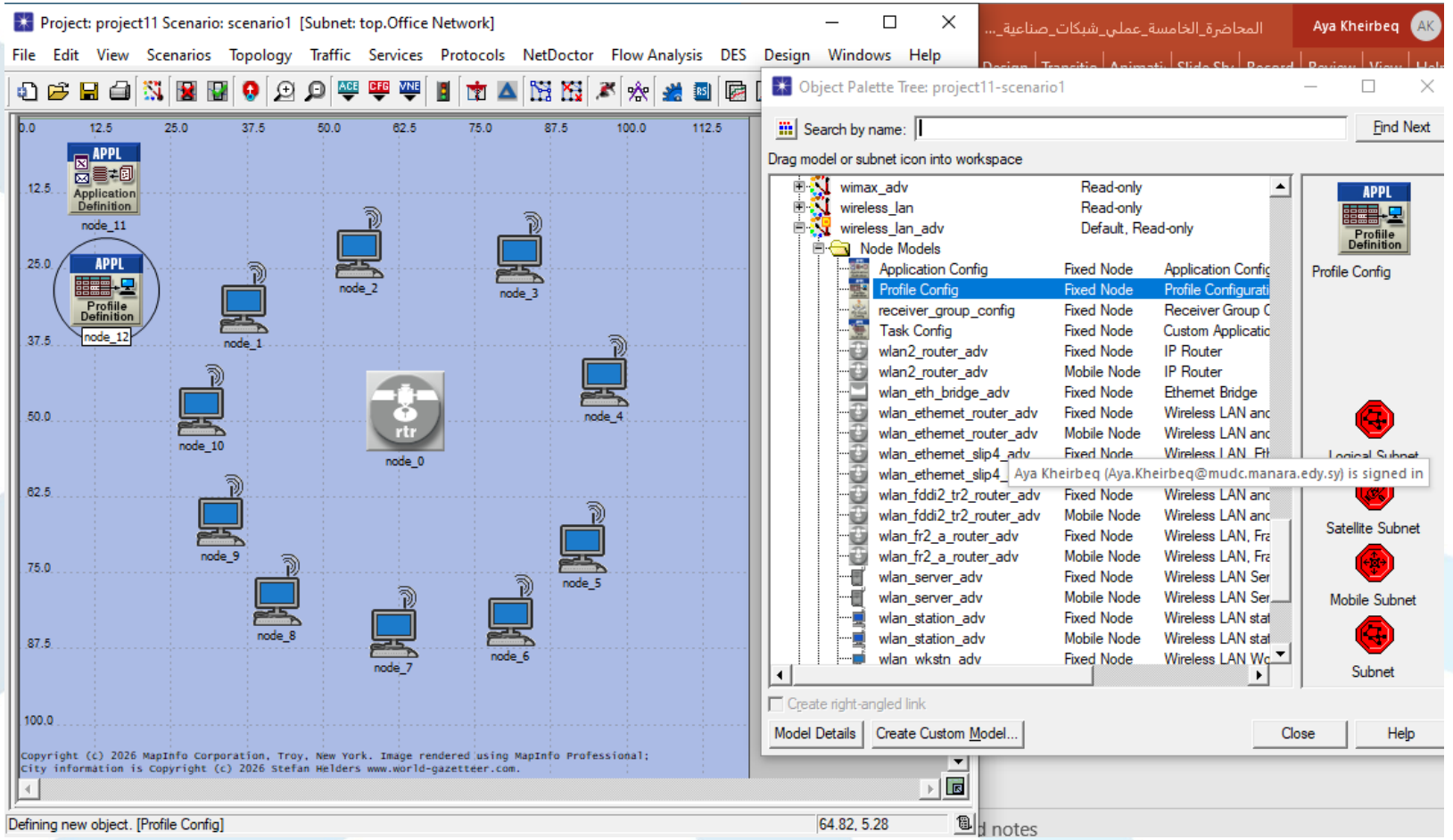
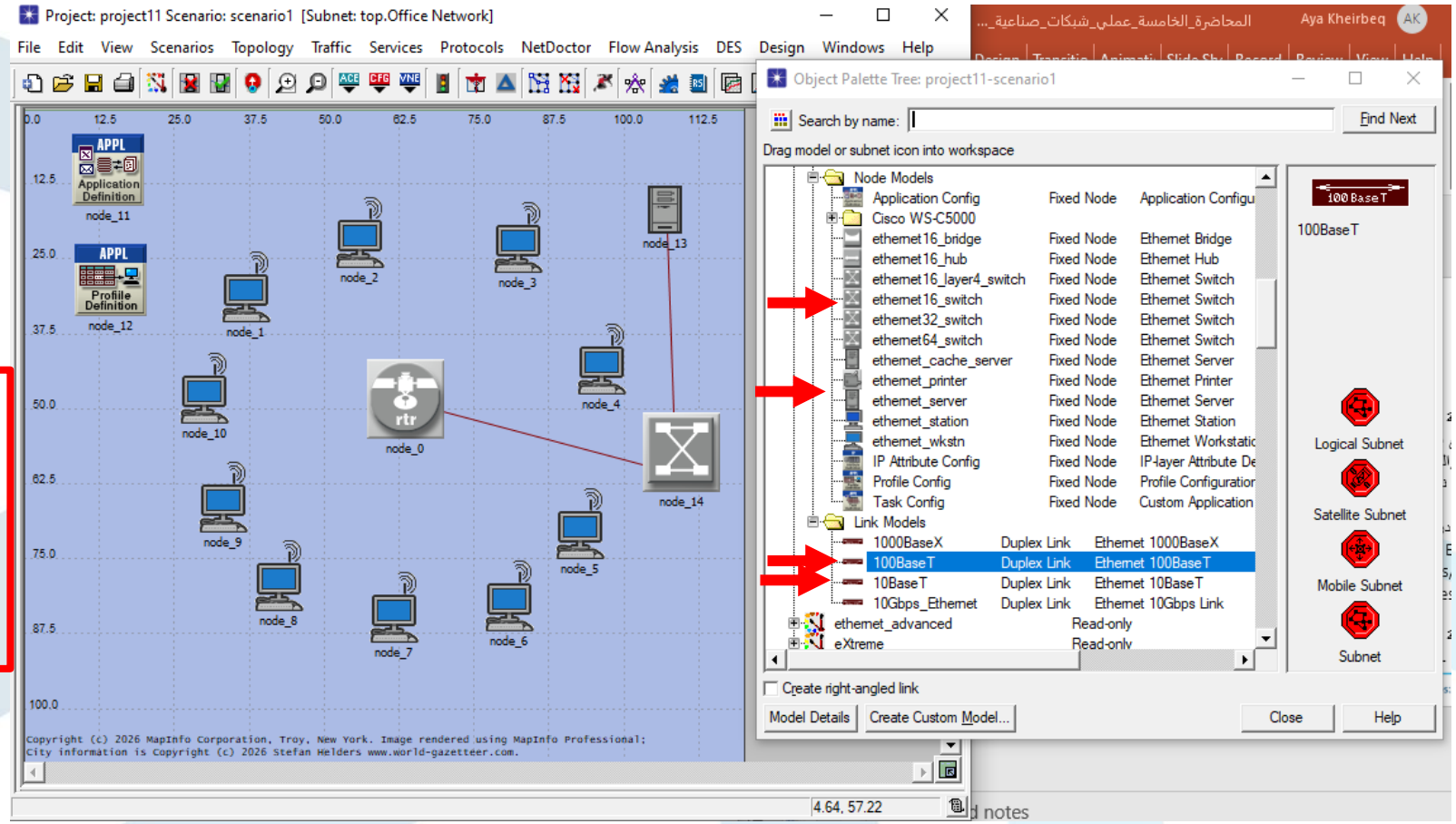
نختار Workstations من نمط fixed بحيث تكون ثابتة في مكانها



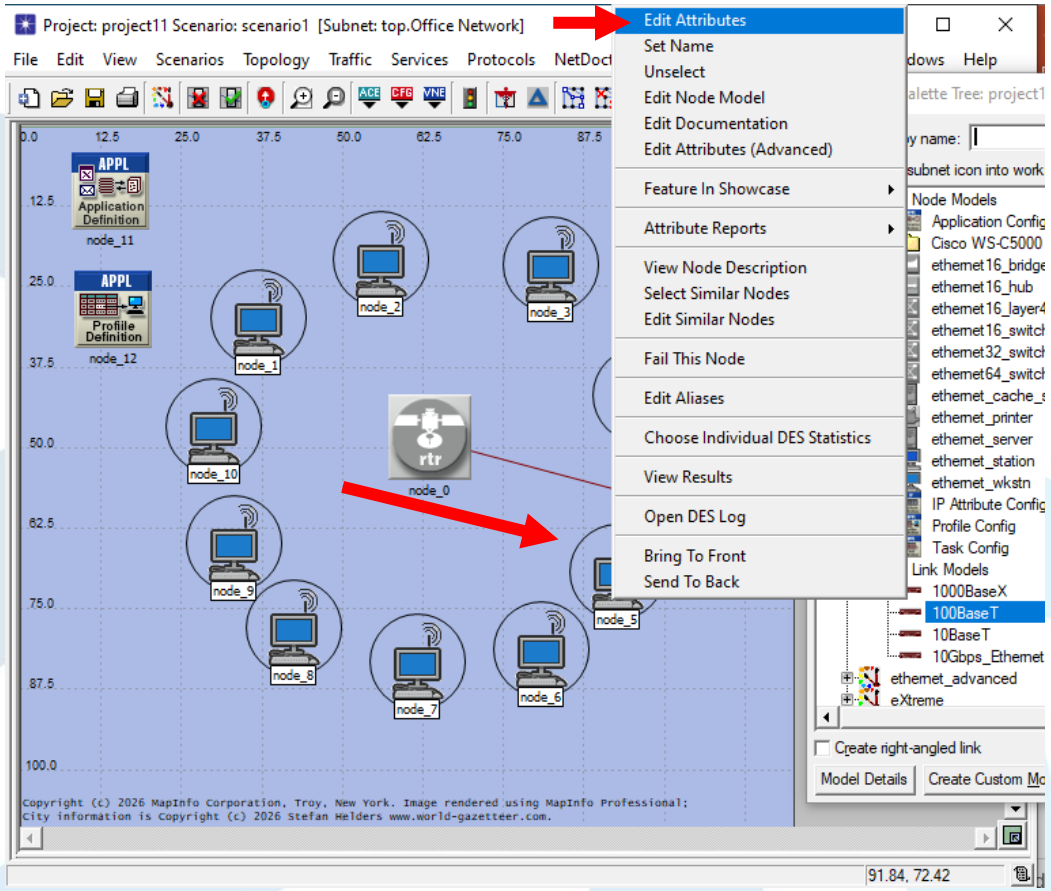
Switch لربط نقاط الوصول مع السيرفر

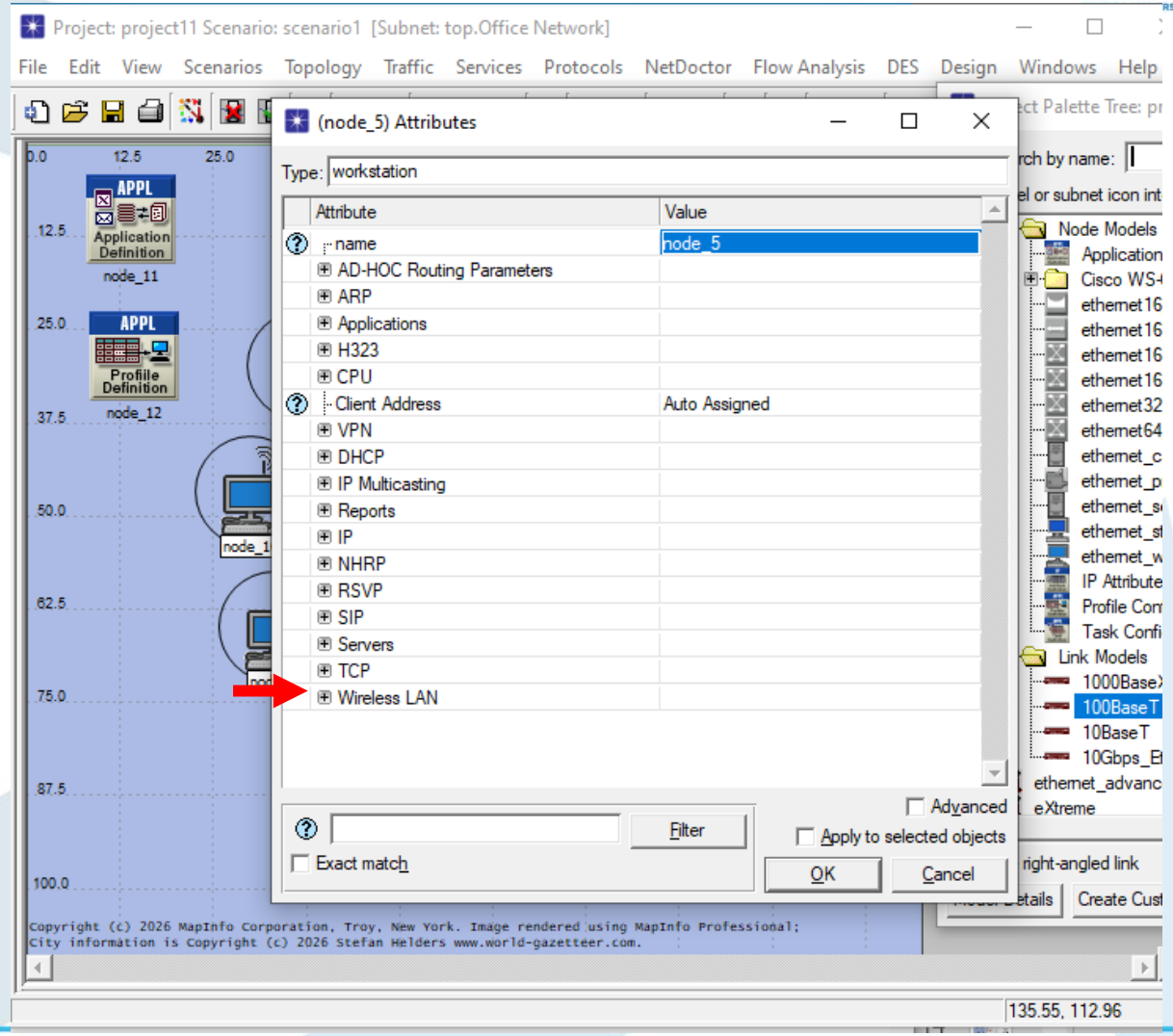
Switch نختاره من قائمة ethernet في شجرة الأدوات

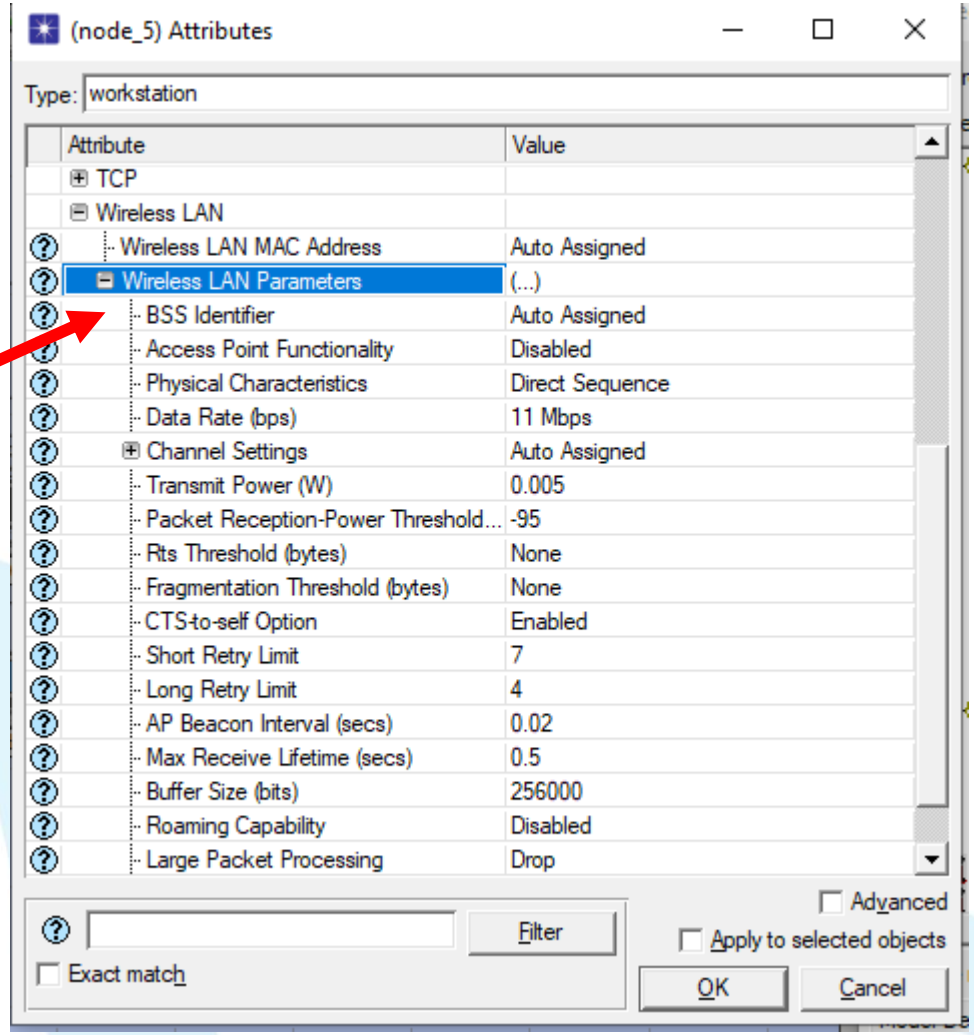
Server نختاره أيضا من قائمة ethernet في شجرة الأدوات



نحدد كافة الأجهزة للقيام بتعريفها على نقطة الوصول و للسماح بنقطة الوصول أيضا بالتعرف عليها و ذلك عن طريق BSS identifier




Project: project11 Scenario: scenario1 [Subnet: top.Office Network]
File Edit View Scenarios Topology Traffic Services Protocols NetDoctor Flow Analysis DES Design Windows Help
(node_5) Attributes
Type: workstation
Attribute
Value
name
node_5
AD-HOC Routing Parameters
ARP
Applications
H323
CPU
Client Address
Auto Assigned
VPN
DHCP
IP Multicasting
Reports
IP
NHRP
RSVP
SIP
Servers
TCP
Wireless LAN
Filter
Exact match
Advanced
Apply to selected objects
OK
Cancel
Node Models
Link Models
100BaseT
10BaseT
Application Definition
Profile Definition
node_11
node_12
Copyright (c) 2026 MapInfo Corporation, Troy, New York. Image rendered using MapInfo Professional;
City information is Copyright (c) 2026 Stefan Helders www.world-gazetteer.com.
135.55, 112.96


(node_5) Attributes
Type: workstation
Attribute
Value
TCP
Wireless LAN
Wireless LAN MAC Address
Auto Assigned
Wireless LAN Parameters
(...)
BSS Identifier
Auto Assigned
Access Point Functionality
Disabled
Physical Characteristics
Direct Sequence
Data Rate (bps)
11 Mbps
Channel Settings
Auto Assigned
Transmit Power (W)
0.005
Packet Reception-Power Threshold...
-95
Rts Threshold (bytes)
None
Fragmentation Threshold (bytes)
None
CTS-to-self Option
Enabled
Short Retry Limit
7
Long Retry Limit
4
AP Beacon Interval (secs)
0.02
Max Receive Lifetime (secs)
0.5
Buffer Size (bits)
256000
Roaming Capability
Disabled
Large Packet Processing
Drop
Filter
Exact match
Advanced
Apply to selected objects
OK
Cancel

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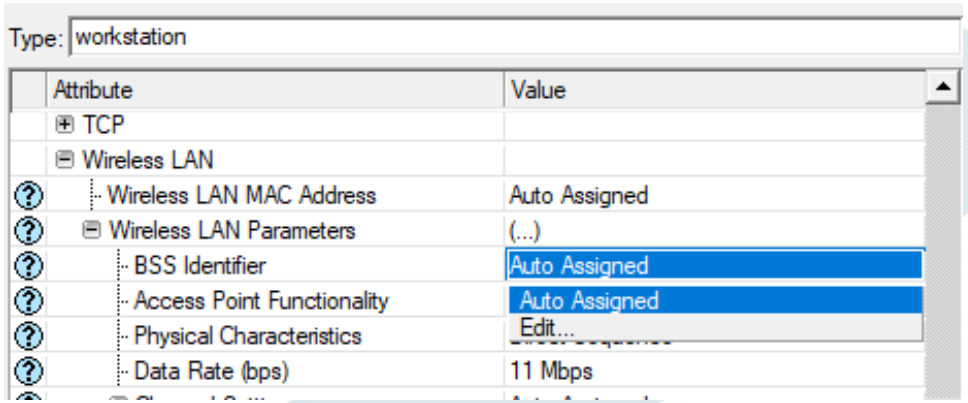
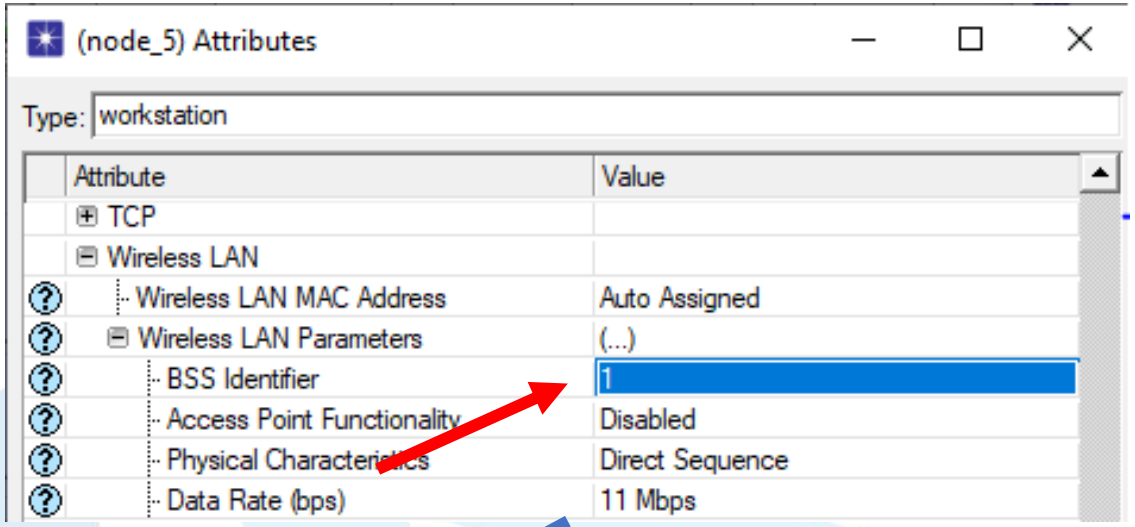
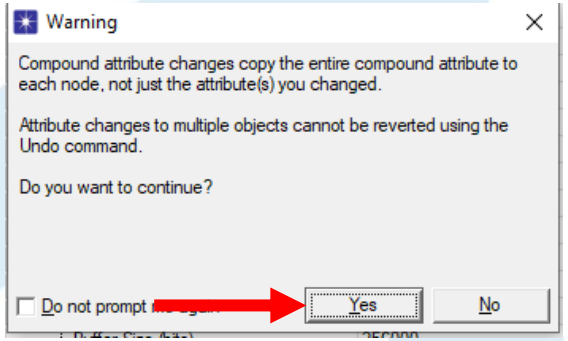
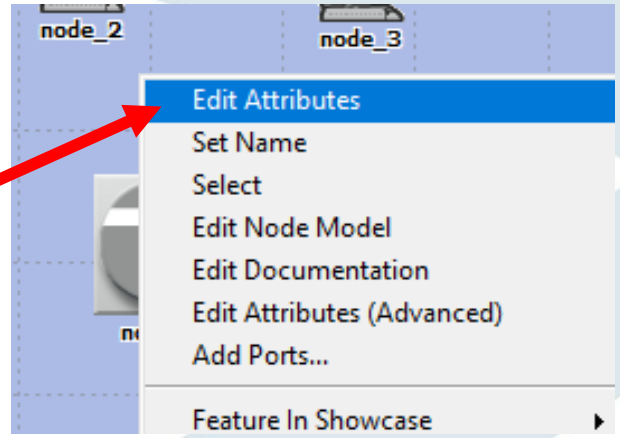
# نعطيه قيمة 1 للطرفيات

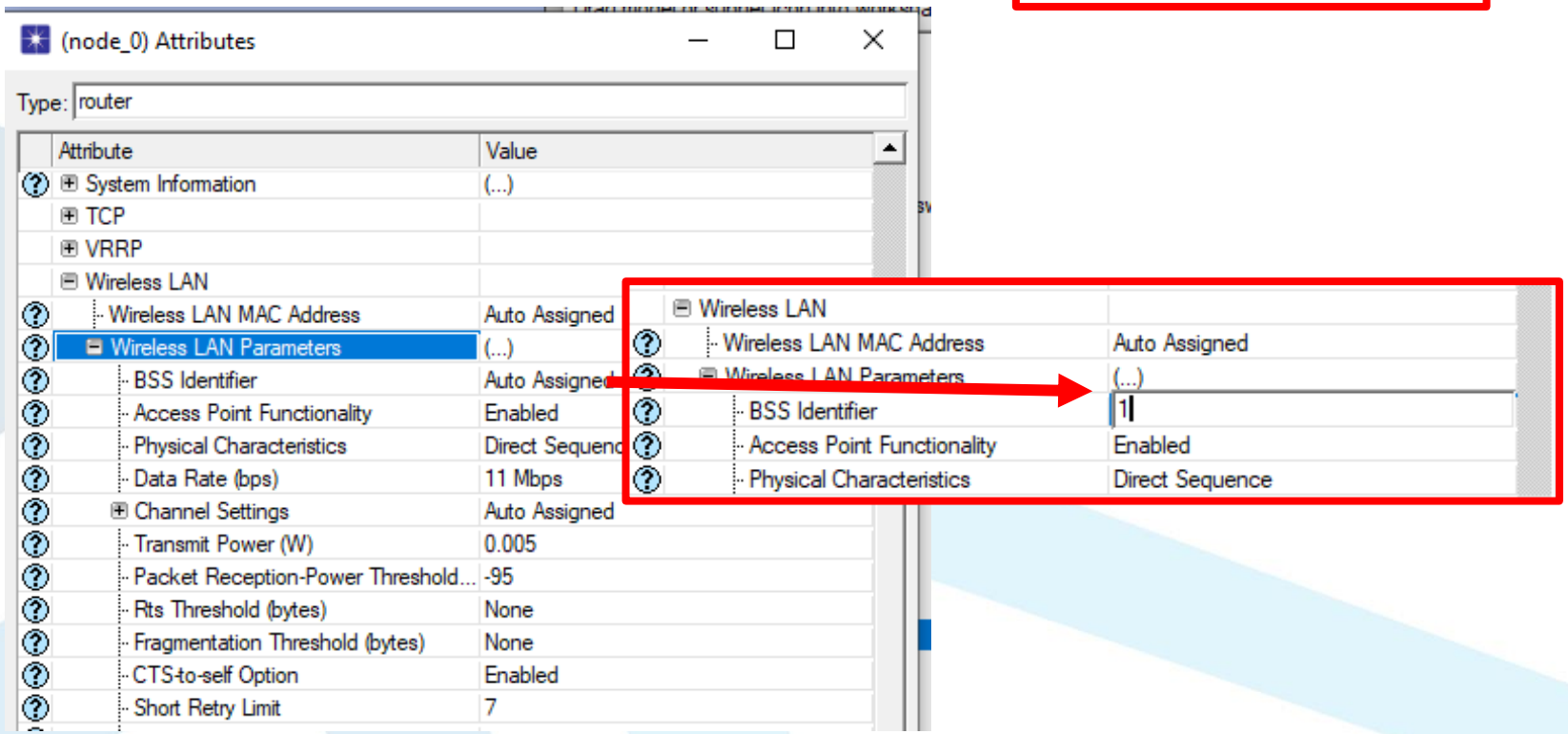


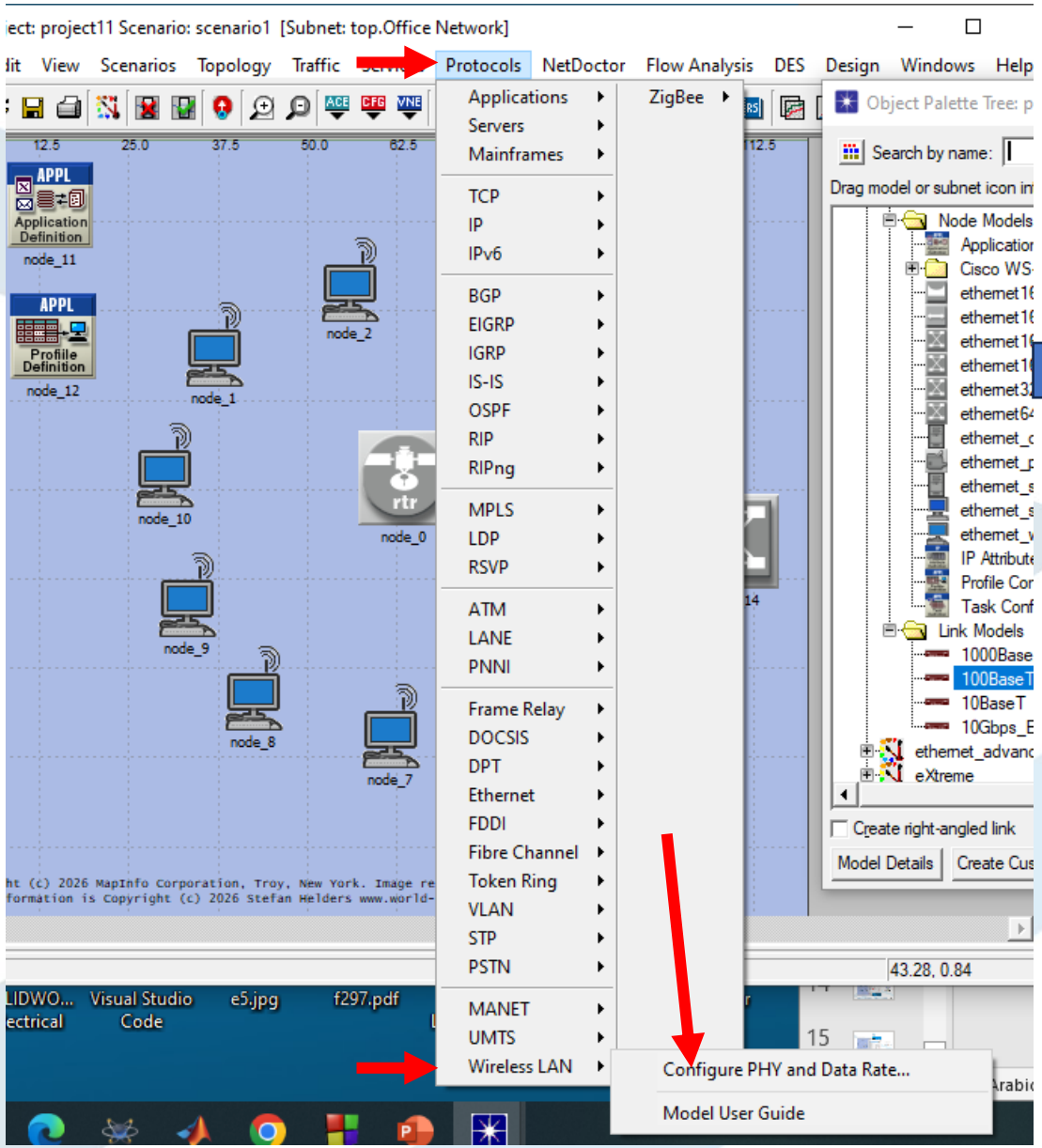



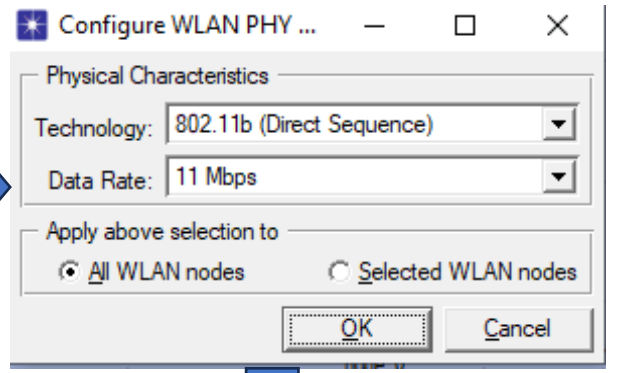



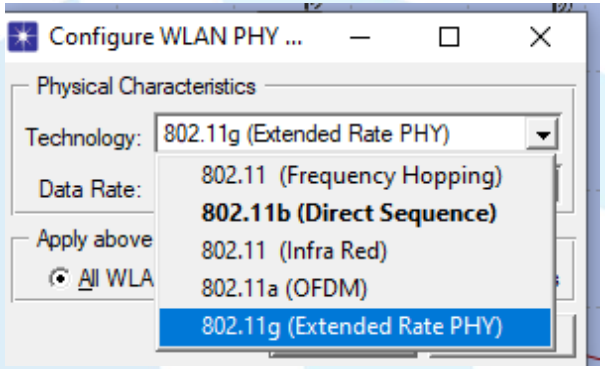
# الراوتر


node_2
node_3
Edit Attributes
Set Name
Select
Edit Node Model
Edit Documentation
Edit Attributes (Advanced)
Add Ports...
Feature In Showcase


(node_0) Attributes
Type: router
Attribute
Value
System Information
(...)
TCP
VRRP
Wireless LAN
Wireless LAN MAC Address
Auto Assigned
Wireless LAN Parameters
(...)
BSS Identifier
Auto Assigned
Access Point Functionality
Enabled
Physical Characteristics
Direct Sequenc
Data Rate (bps)
11 Mbps
Channel Settings
Auto Assigned
Transmit Power (W)
0.005
Packet Reception-Power Threshold...
-95
Rts Threshold (bytes)
None
Fragmentation Threshold (bytes)
None
CTS-to-self Option
Enabled
Short Retry Limit
7
Wireless LAN
Wireless LAN MAC Address
Auto Assigned
Wireless LAN Parameters
(...)
BSS Identifier
1
Access Point Functionality
Enabled
Physical Characteristics
Direct Sequence



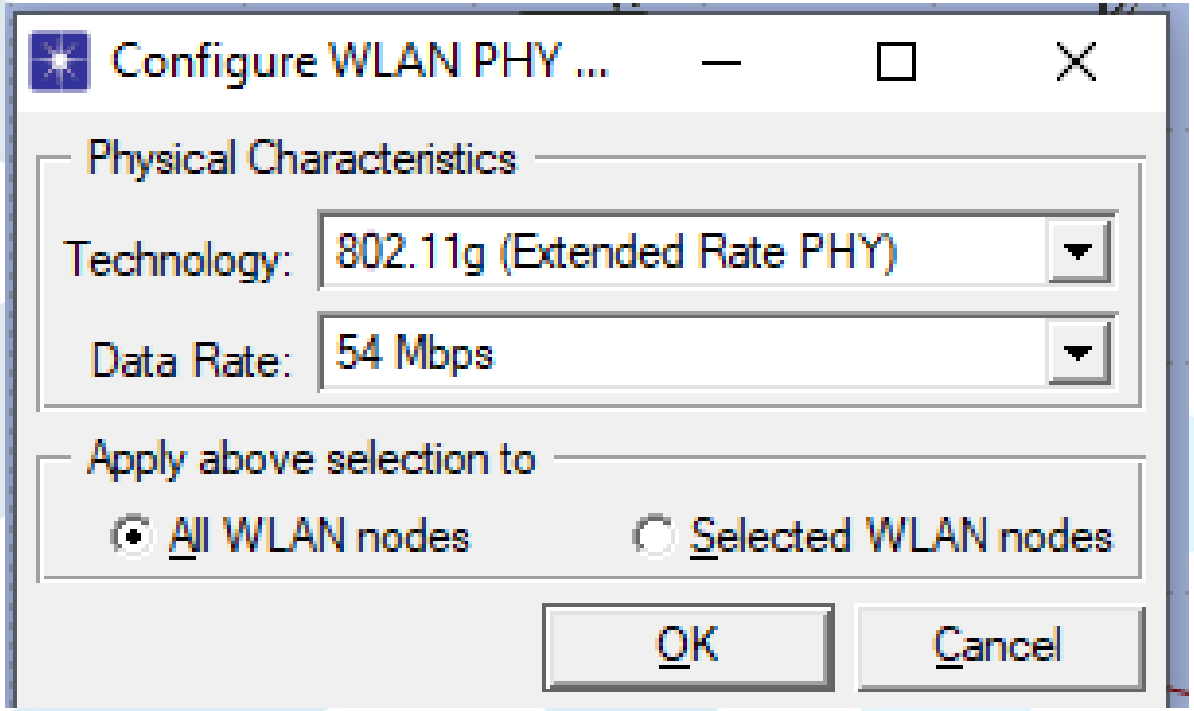

لتعديل بروتوكول الشبكة بحيث نحدد الحزمة التي يعمل عليها من ثائمة protocols

نختار wireless

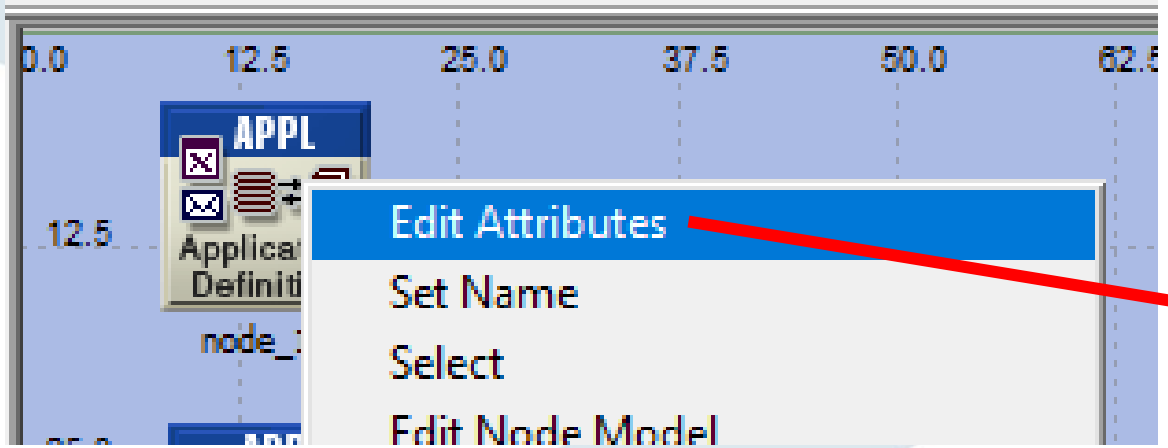
802.11g

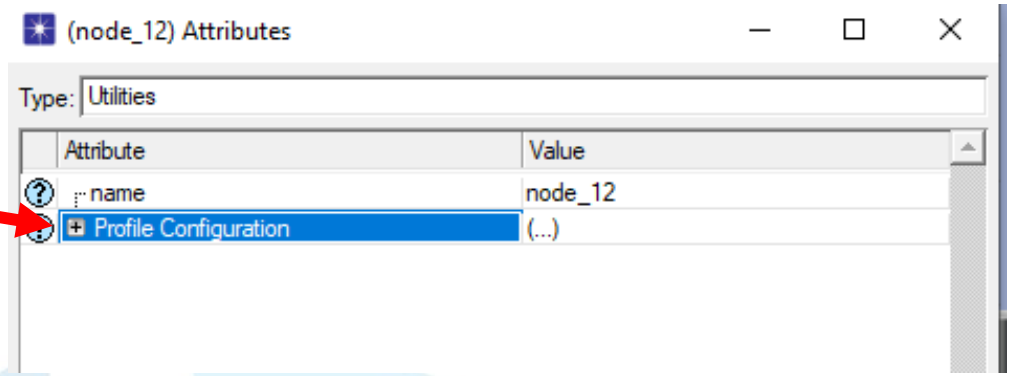
و سرعة 54

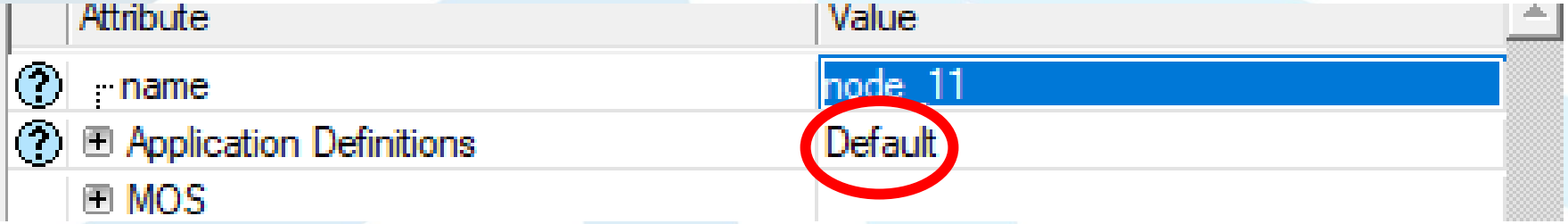
Mbps



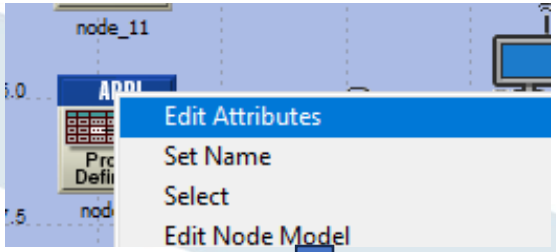
# Application Configuration

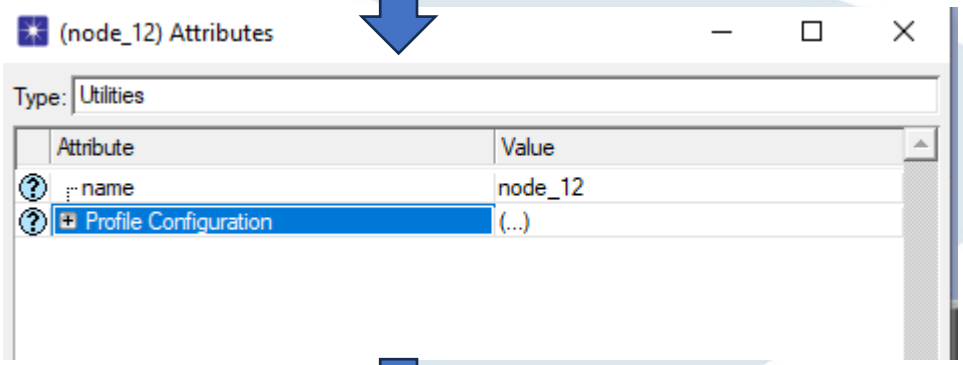


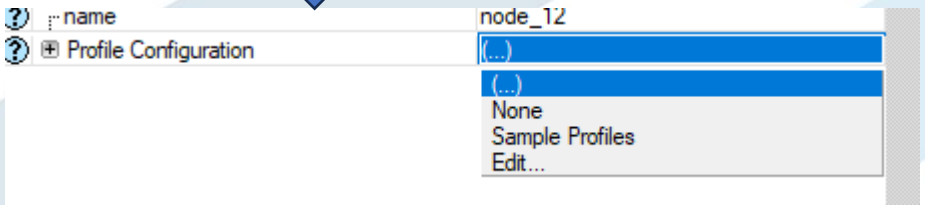



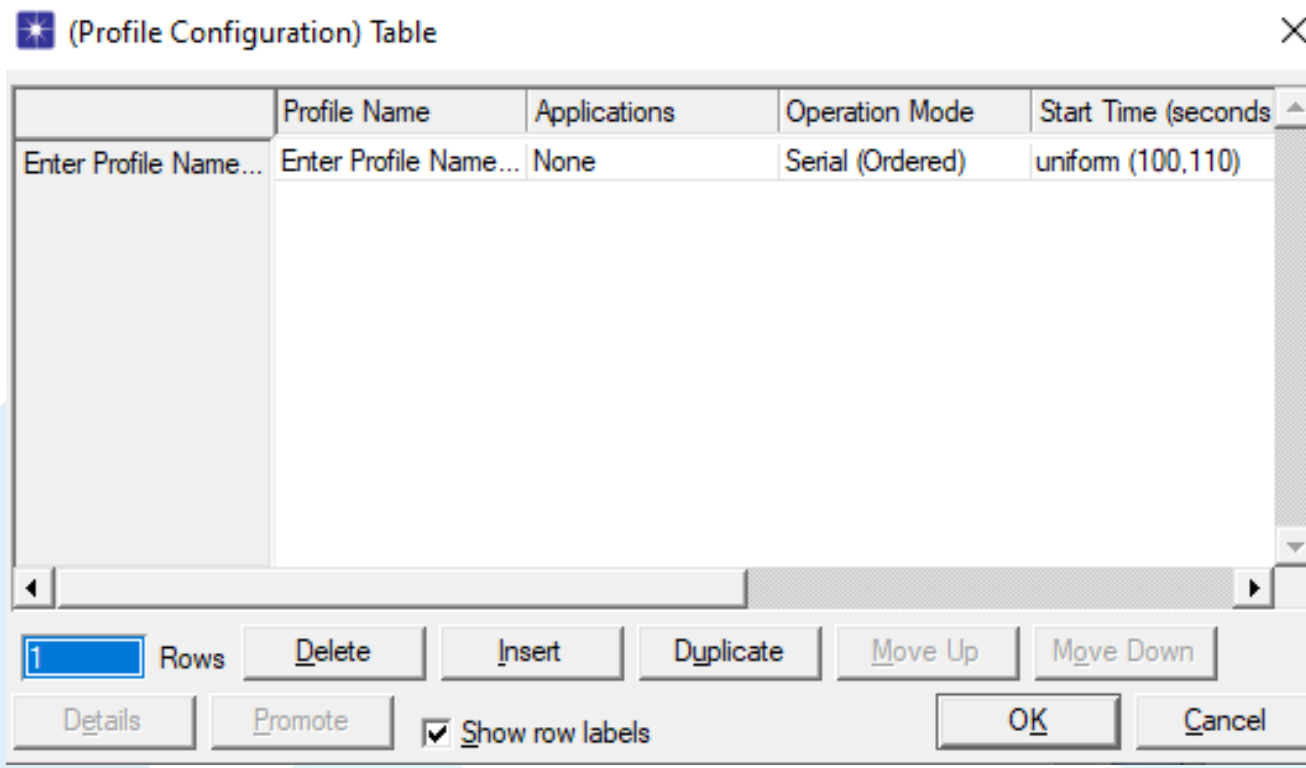



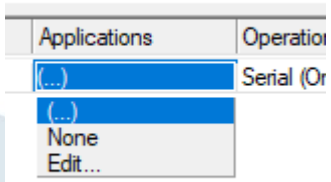
# Profile Configuration

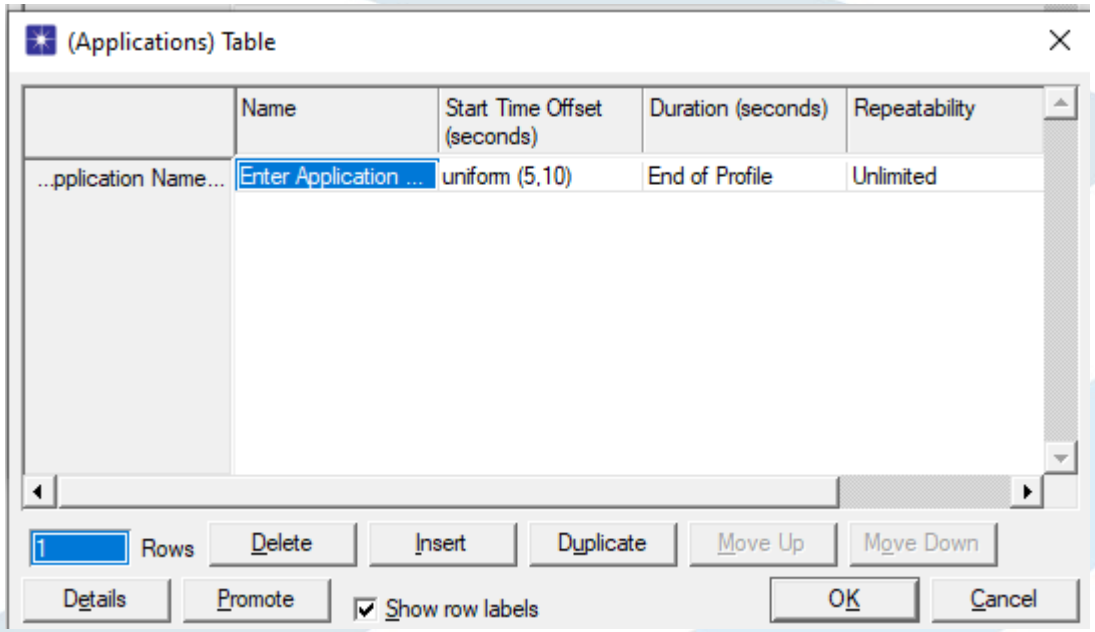


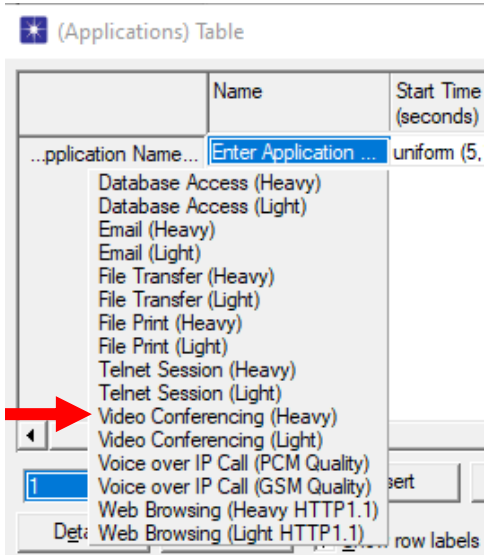



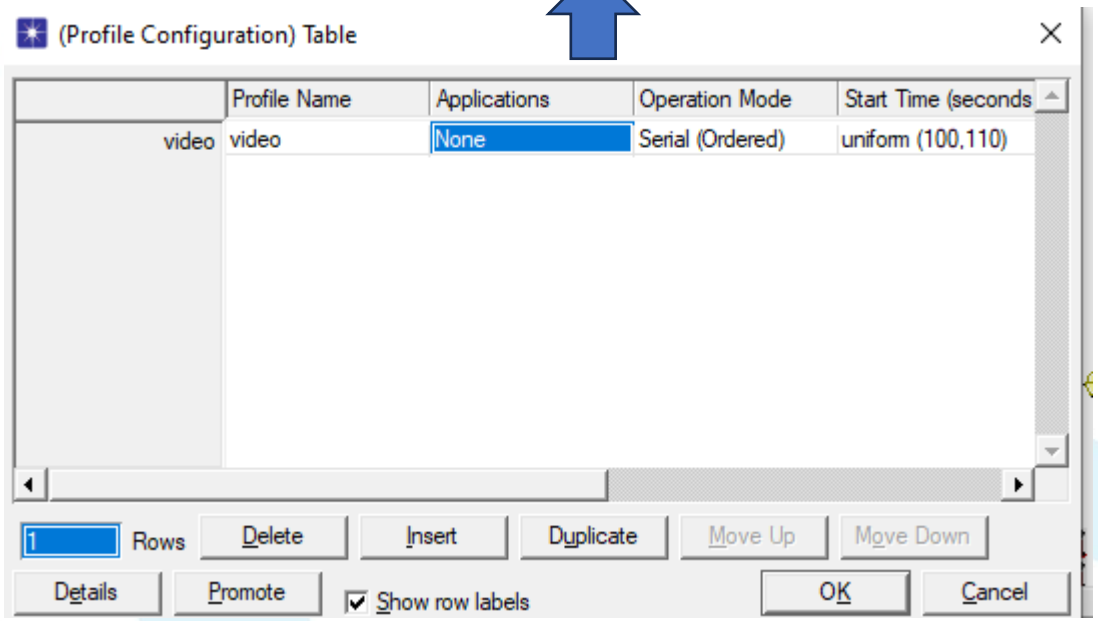



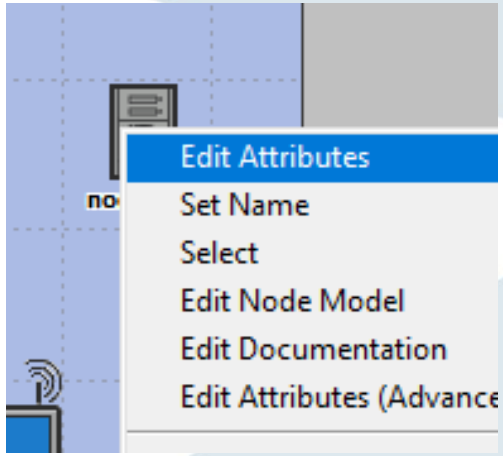

Applications
Operatio
(...)
Serial (Or
(...)
None
Edit...

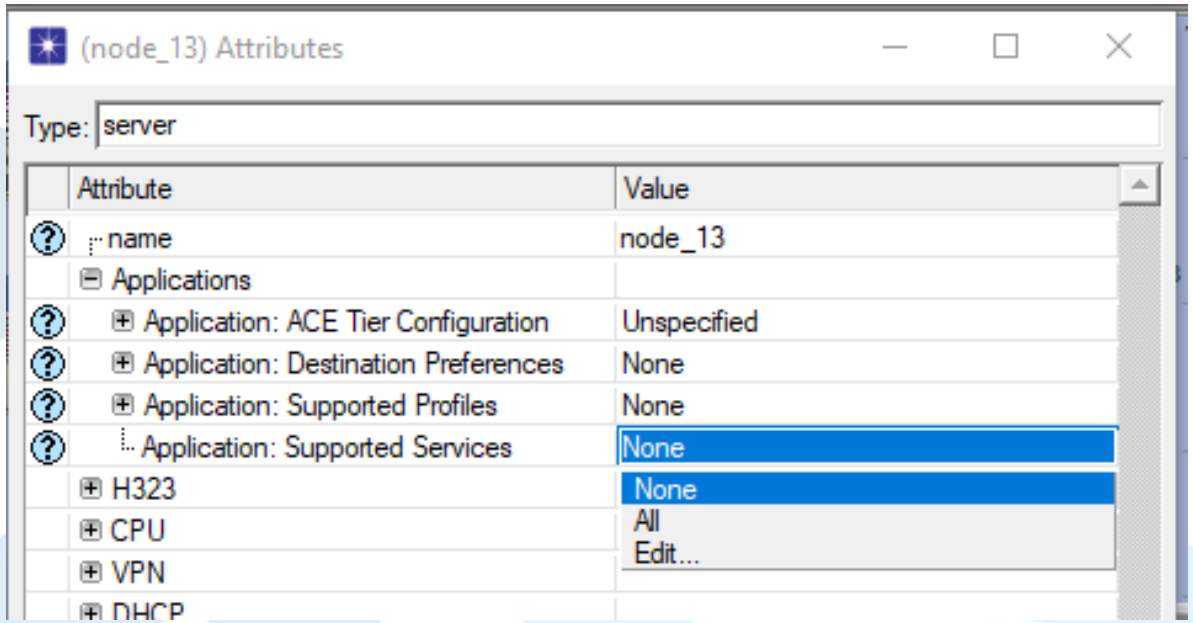

(Applications) Table
Name
Start Time Offset (seconds)
Duration (seconds)
Repeatability
...pplication Name...
Enter Application ...
uniform (5,10)
End of Profile
Unlimited
1
Rows
Delete
Insert
Duplicate
Move Up
Move Down
Details
Promote
Show row labels
OK
Cancel

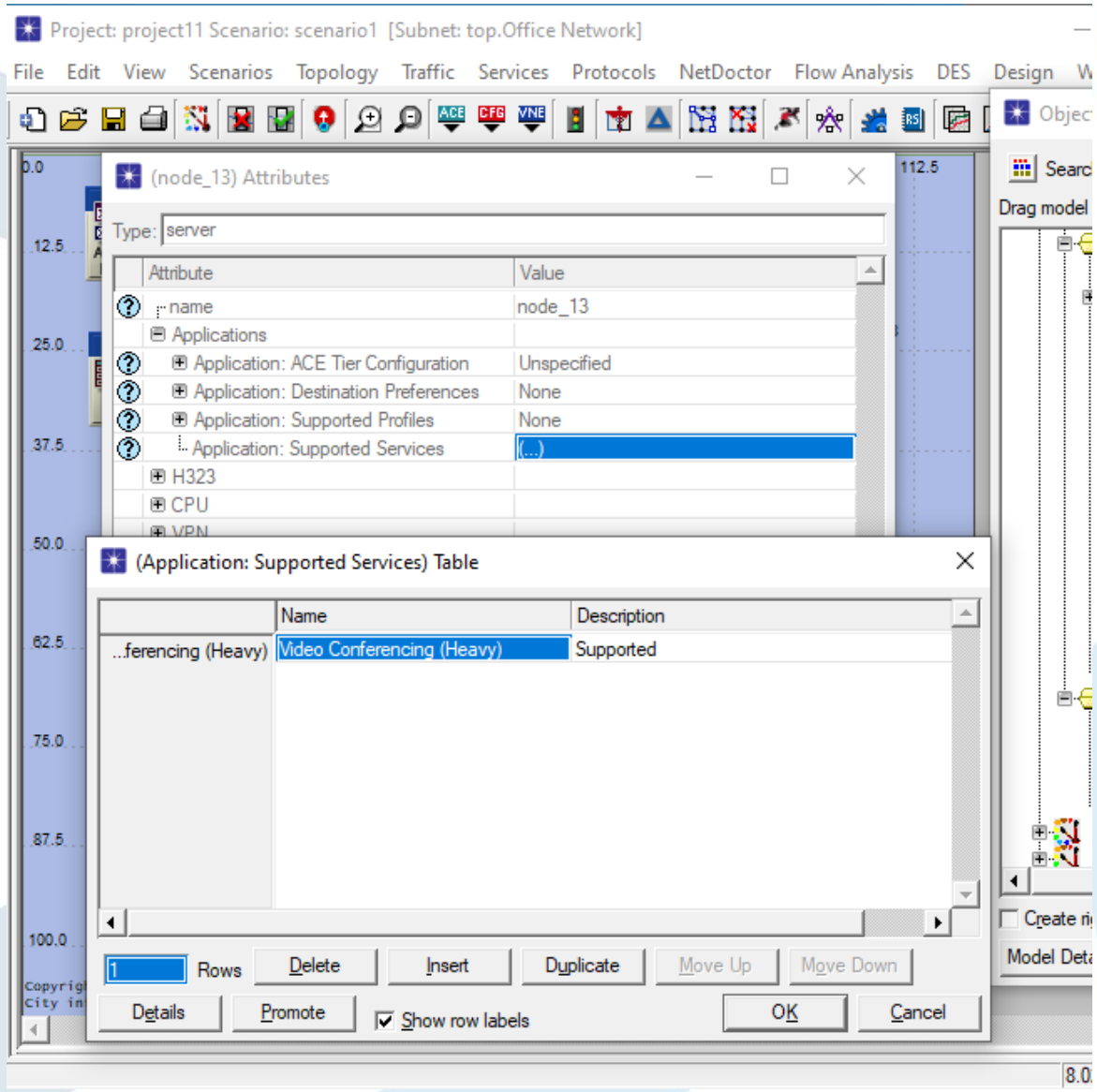

(Applications) Table
Name
Start Time (seconds)
...pplication Name...
Enter Application ...
uniform (5,
Database Access (Heavy)
Database Access (Light)
Email (Heavy)
Email (Light)
File Transfer (Heavy)
File Transfer (Light)
File Print (Heavy)
File Print (Light)
Telnet Session (Heavy)
Telnet Session (Light)
Video Conferencing (Heavy)
Video Conferencing (Light)
Voice over IP Call (PCM Quality)
Voice over IP Call (GSM Quality)
Web Browsing (Heavy HTTP1.1)
Web Browsing (Light HTTP1.1)
1
row labels

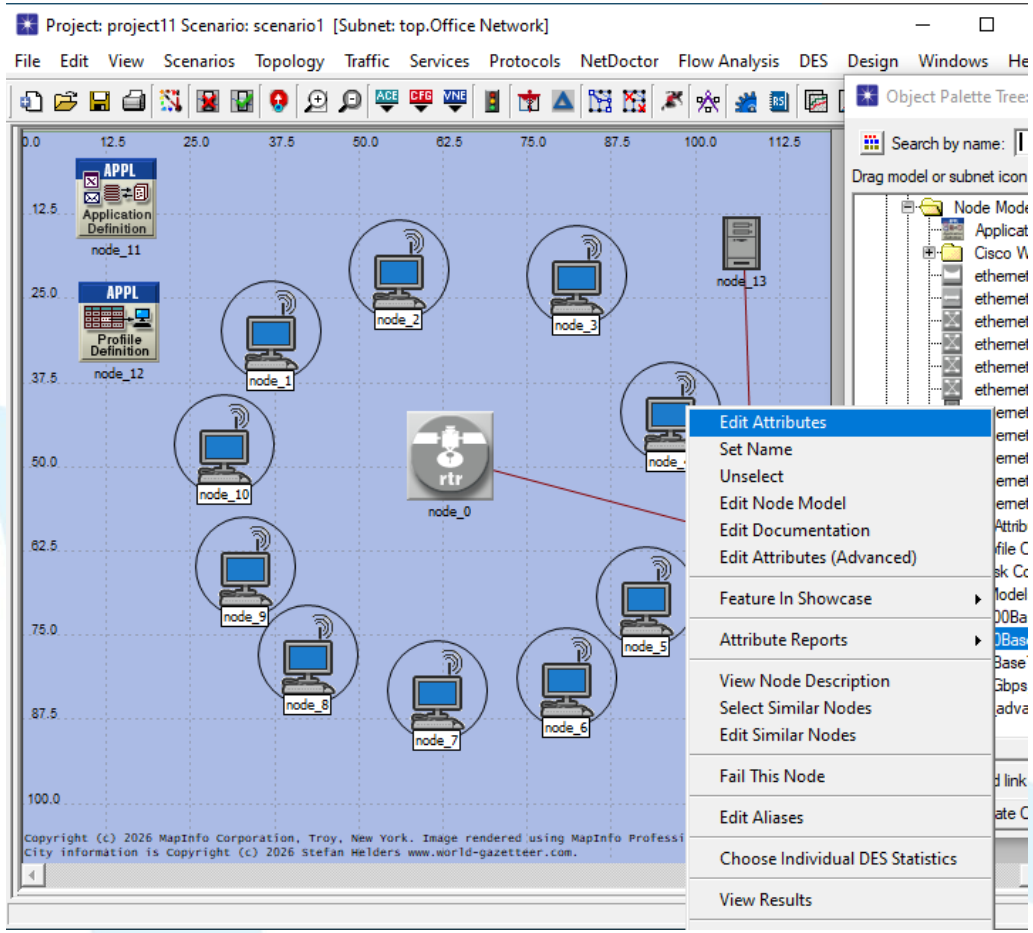

(Profile Configuration) Table
Profile Name
Applications
Operation Mode
Start Time (seconds
video
video
None
Serial (Ordered)
uniform (100,110)
1
Rows
Delete
Insert
Duplicate
Move Up
Move Down
Details
Promote
Show row labels
OK
Cancel

# Server Configuration

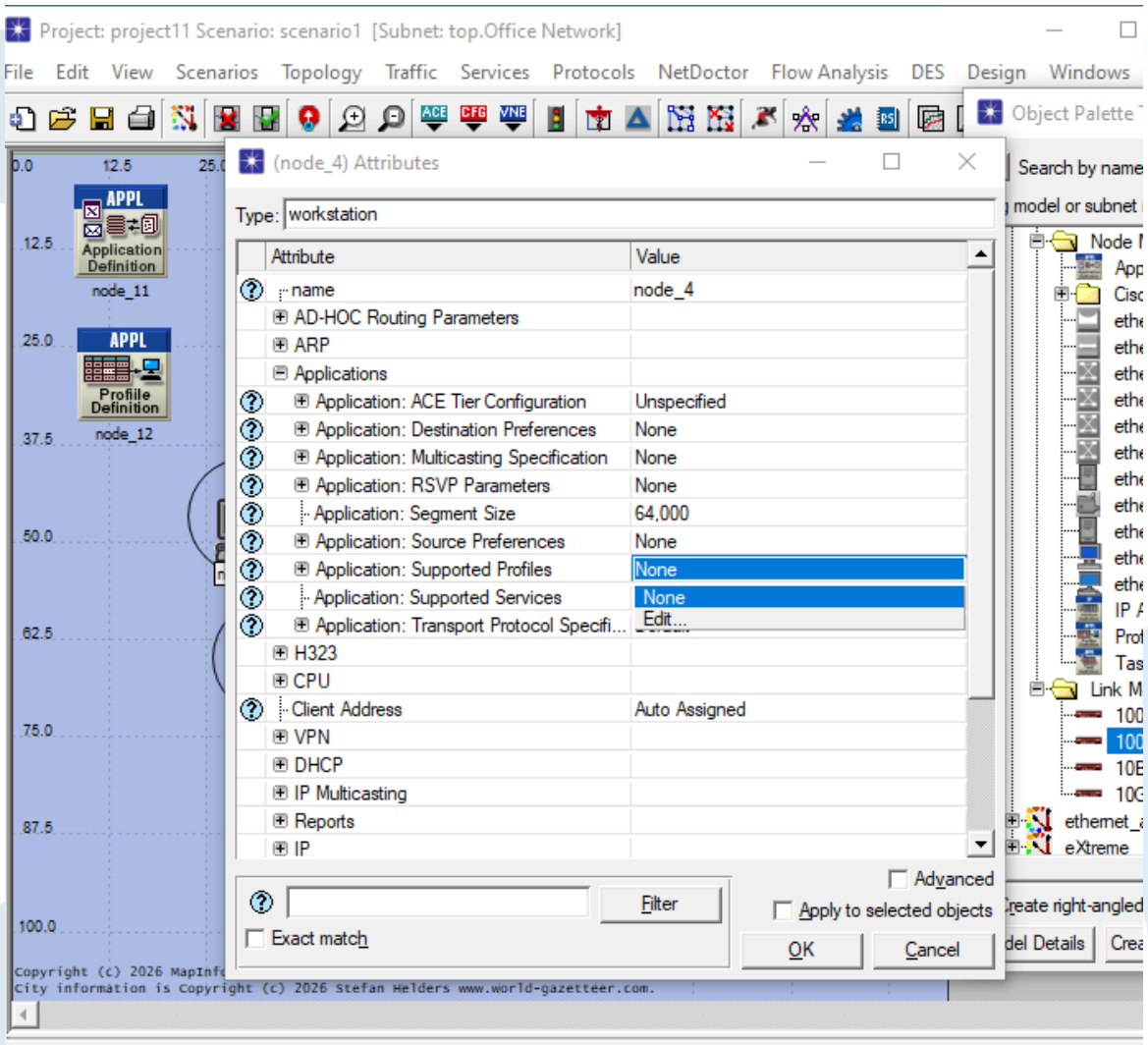


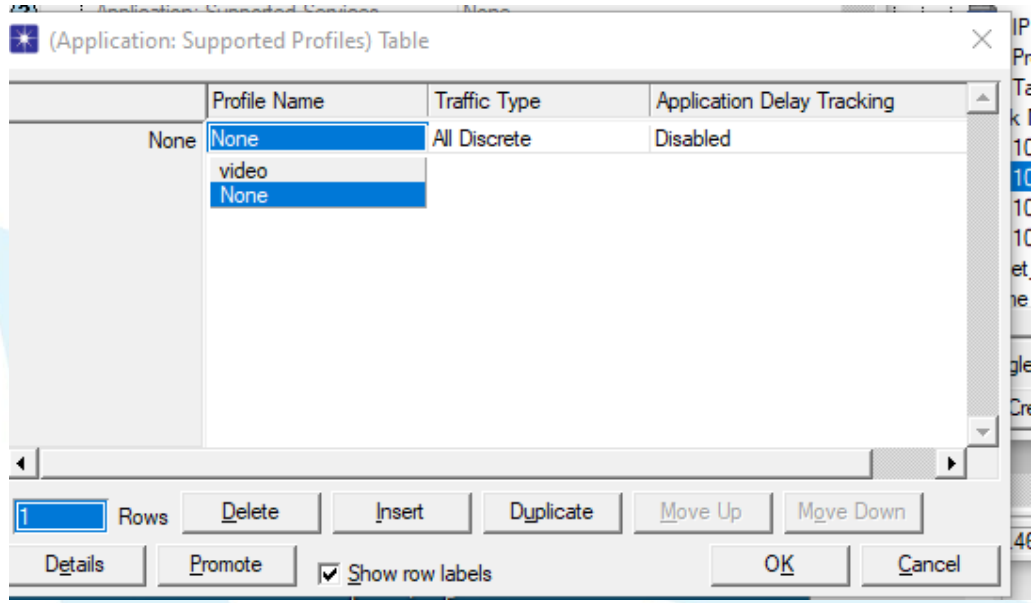



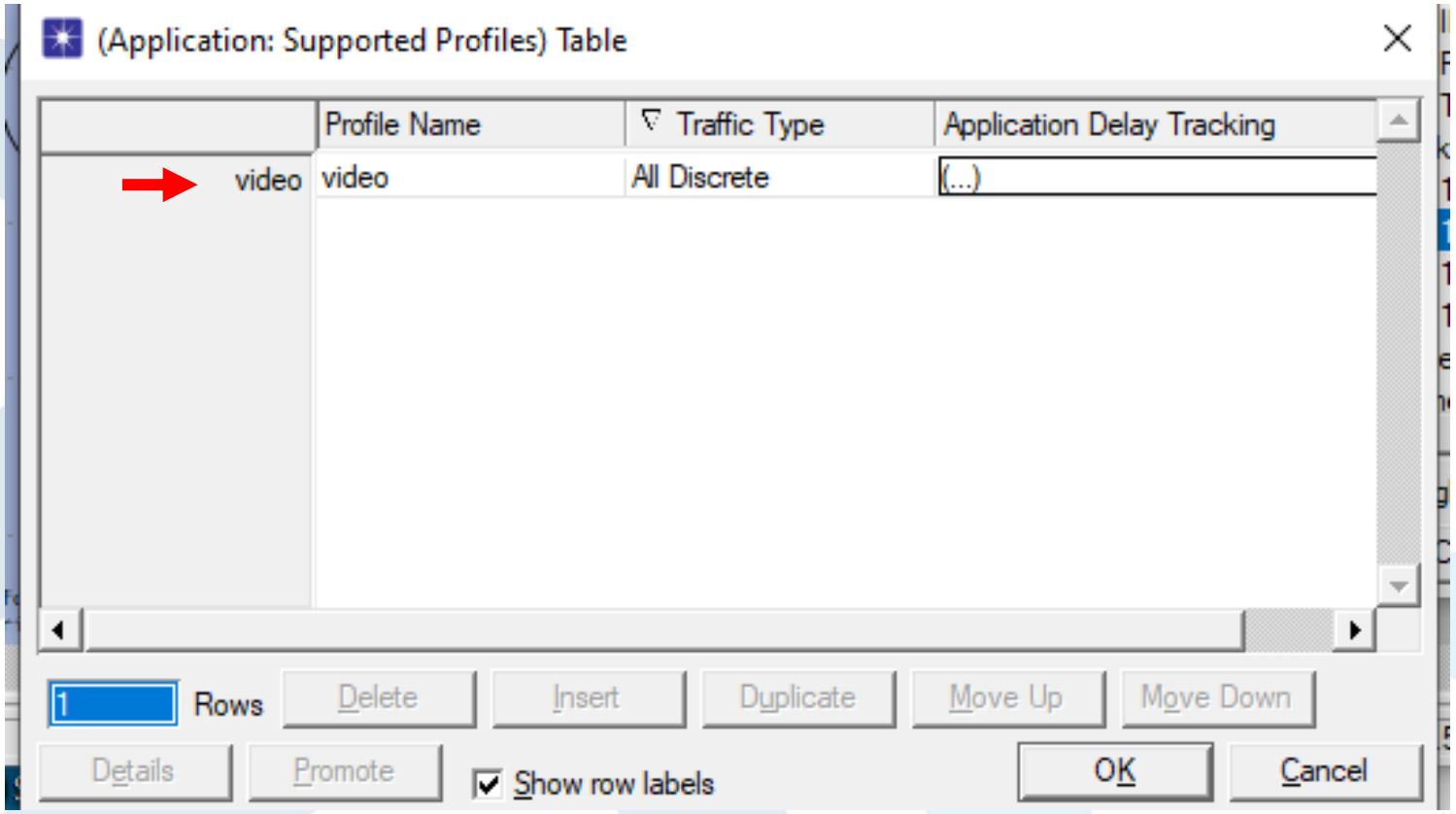

Project: project11 Scenario: scenario1 [Subnet: top.Office Network]
File Edit View Scenarios Topology Traffic Services Protocols NetDoctor Flow Analysis DES Design
(node_13) Attributes
Type: server
Attribute
Value
name
node_13
Applications
Application: ACE Tier Configuration
Unspecified
Application: Destination Preferences
None
Application: Supported Profiles
None
Application: Supported Services
(...)
H323
CPU
(Application: Supported Services) Table
Name
Description
...ferencing (Heavy)
Video Conferencing (Heavy)
Supported
Rows
Delete
Insert
Duplicate
Move Up
Move Down
Details
Promote
Show row labels
OK
Cancel
Drag model

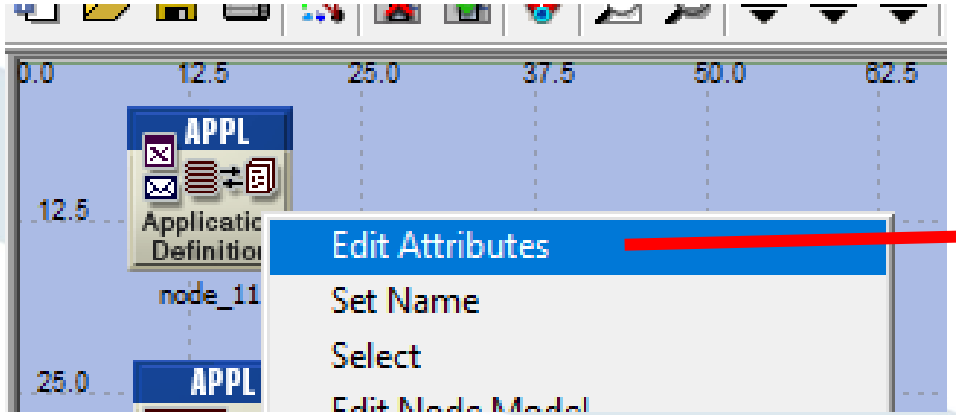

Project: project11 Scenario: scenario1 [Subnet: top.Office Network]
File Edit View Scenarios Topology Traffic Services Protocols NetDoctor Flow Analysis DES Design Windows
APPL
Application Definition
node_11
APPL
Profile Definition
node_12
node_0
node_1
node_2
node_3
node_5
node_6
node_7
node_8
node_9
node_10
node_13
rtr
Edit Attributes
Set Name
Unselect
Edit Node Model
Edit Documentation
Edit Attributes (Advanced)
Feature In Showcase
Attribute Reports
View Node Description
Select Similar Nodes
Edit Similar Nodes
Fail This Node
Edit Aliases
Choose Individual DES Statistics
View Results
Search by name:
Drag model or subnet icon

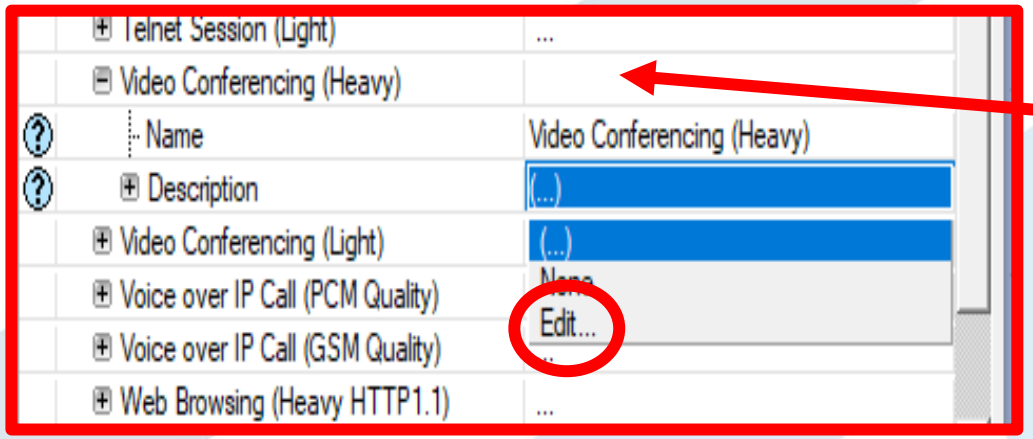
# Supported Profiles

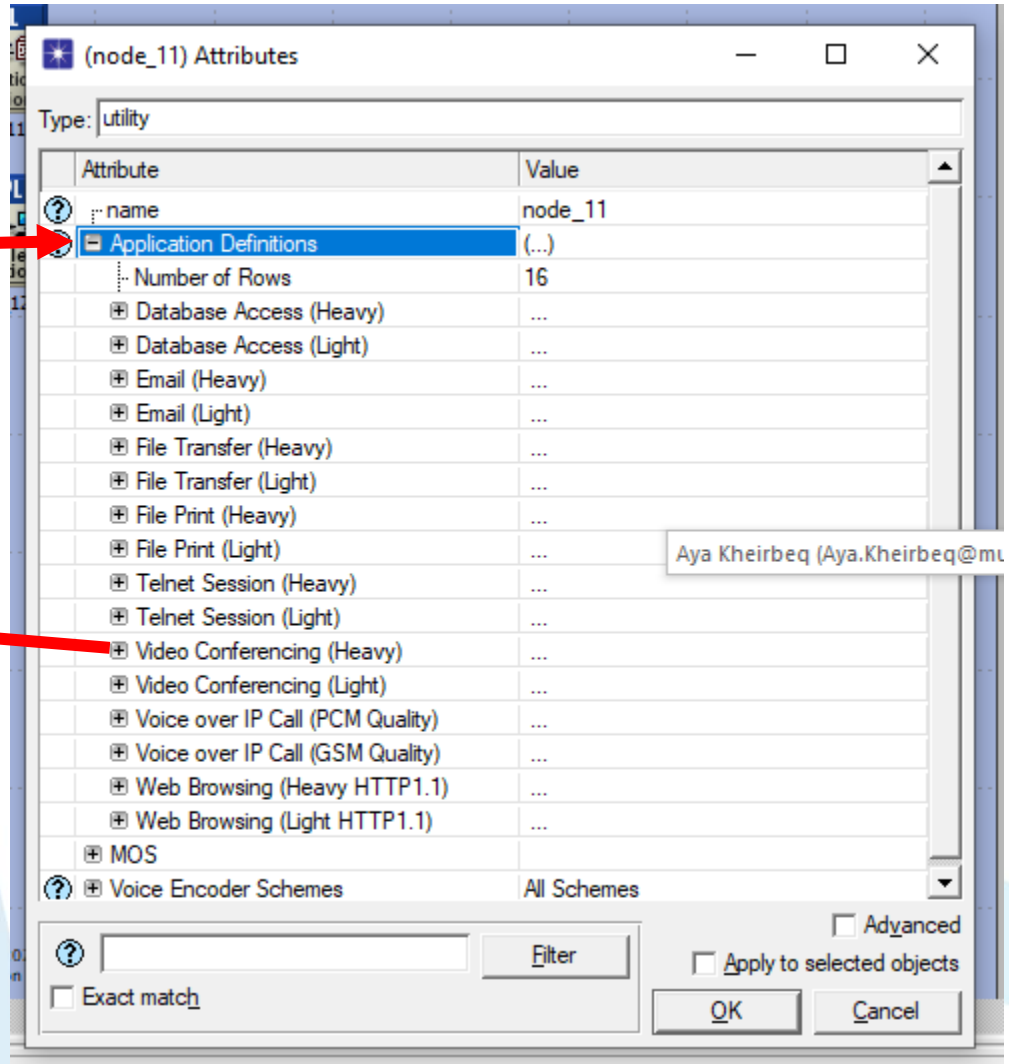


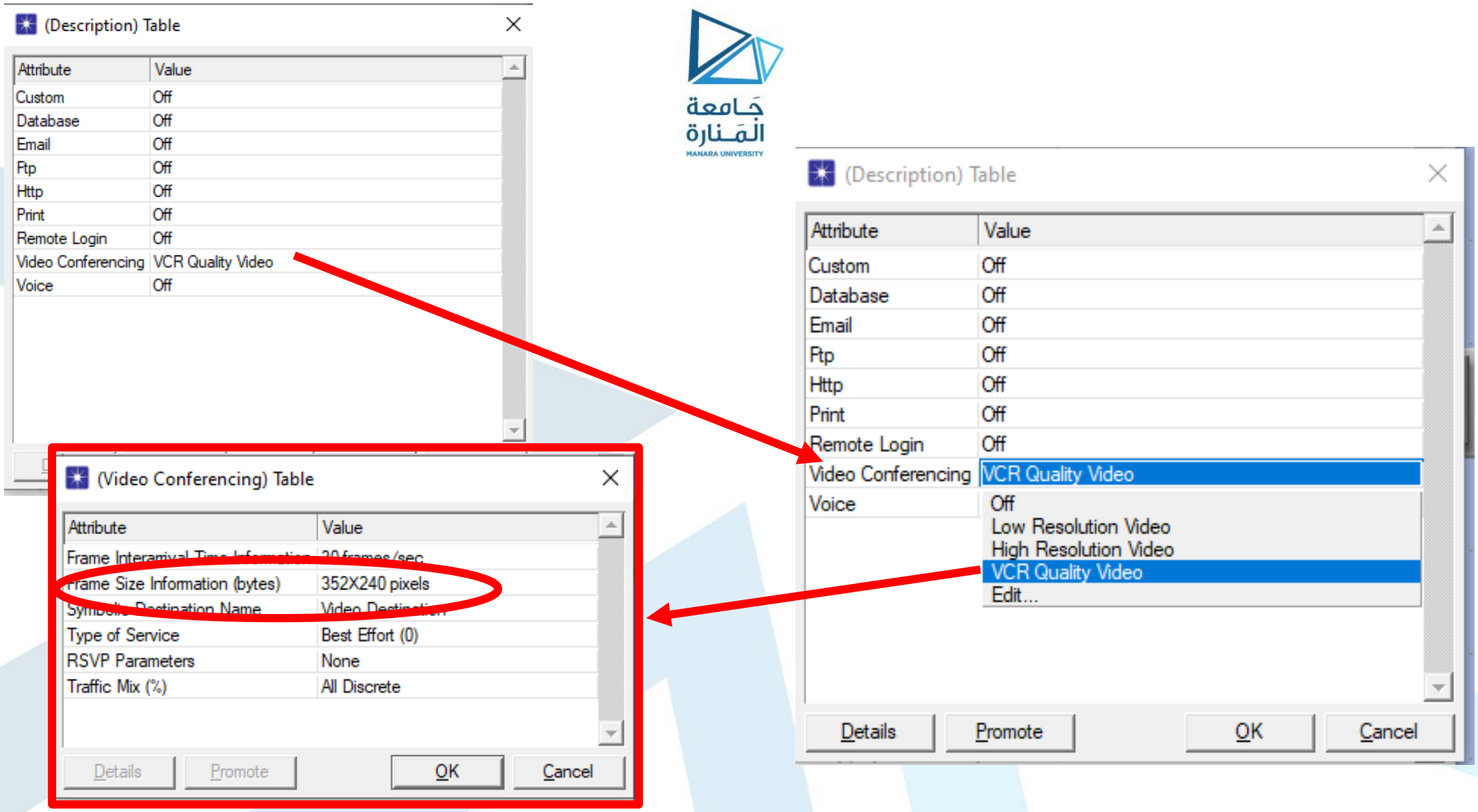



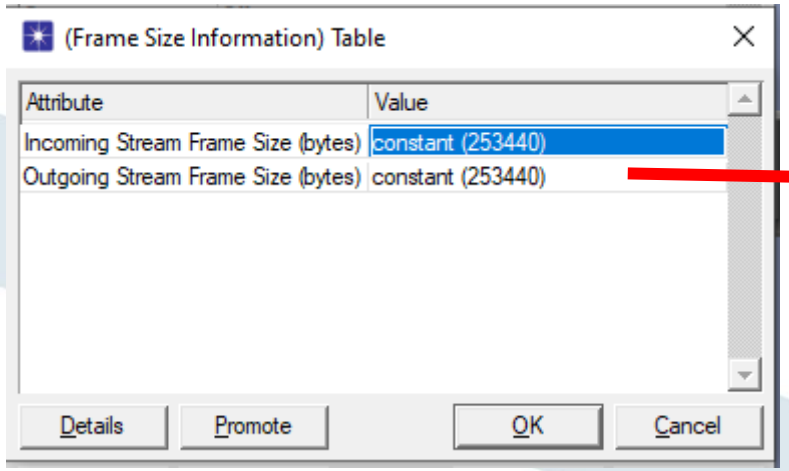

(Application: Supported Profiles) Table
Profile Name
Traffic Type
Application Delay Tracking
video
video
All Discrete
(...)
1
Rows
Delete
Insert
Duplicate
Move Up
Move Down
Details
Promote
Show row labels
OK
Cancel

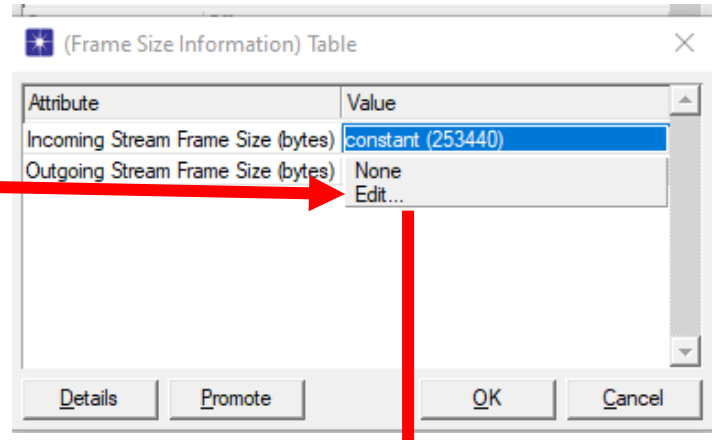

0.0
12.5
25.0
37.5
50.0
62.5
APPL
Applicatic
Definitio
node_11
APPL
Edit Attributes
Set Name
Select

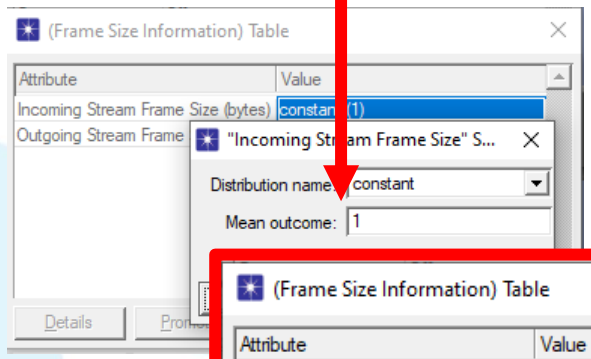

Telnet Session (Light)
Video Conferencing (Heavy)
Name
Video Conferencing (Heavy)
Description
Video Conferencing (Light)
Voice over IP Call (PCM Quality)
Voice over IP Call (GSM Quality)
Web Browsing (Heavy HTTP1.1)
Edit...

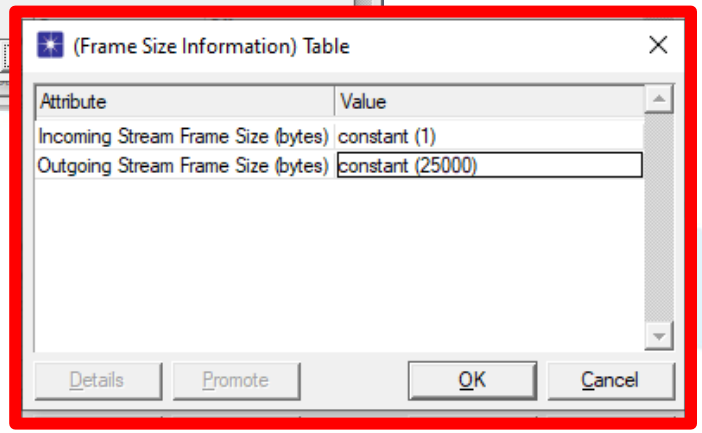

(node_11) Attributes
Type: utility
Attribute
Value
name
node_11
Application Definitions
(...)
Number of Rows
16
Database Access (Heavy)
Database Access (Light)
Email (Heavy)
Email (Light)
File Transfer (Heavy)
File Transfer (Light)
File Print (Heavy)
File Print (Light)
Telnet Session (Heavy)
Telnet Session (Light)
Video Conferencing (Heavy)
Video Conferencing (Light)
Voice over IP Call (PCM Quality)
Voice over IP Call (GSM Quality)
Web Browsing (Heavy HTTP1.1)
Web Browsing (Light HTTP1.1)
MOS
Voice Encoder Schemes
All Schemes
Advanced
Filter
Apply to selected objects
Exact match
OK
Cancel


(Description) Table
Attribute
Value
Custom
Off
Database
Off
Email
Off
Ftp
Off
Http
Off
Print
Off
Remote Login
Off
Video Conferencing
VCR Quality Video
Voice
Off
(Video Conferencing) Table
Attribute
Value
Frame Size Information (bytes)
352X240 pixels
Type of Service
Best Effort (0)
RSVP Parameters
None
Traffic Mix (%)
All Discrete
Details
Promote
OK
Cancel
(Description) Table
Attribute
Value
Custom
Off
Database
Off
Email
Off
Ftp
Off
Http
Off
Print
Off
Remote Login
Off
Video Conferencing
VCR Quality Video
Voice
Off
Low Resolution Video
High Resolution Video
VCR Quality Video
Edit...
Details
Promote
OK
Cancel



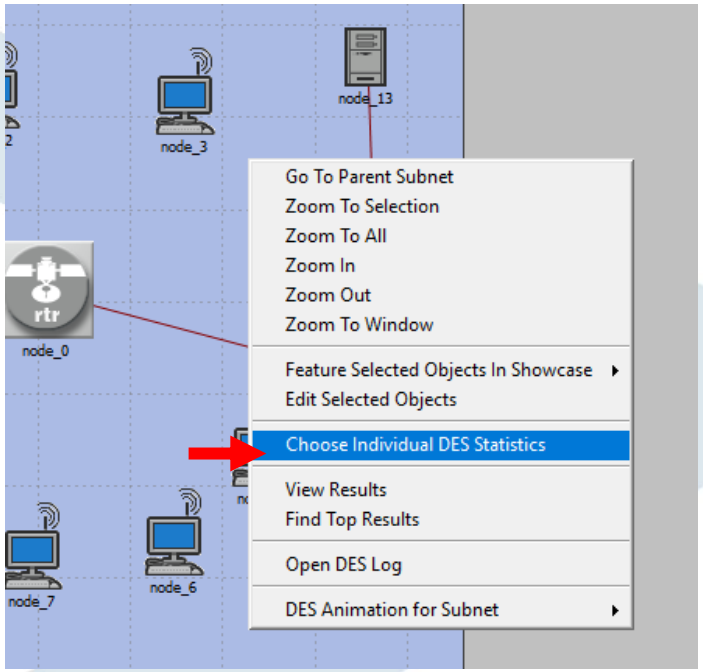



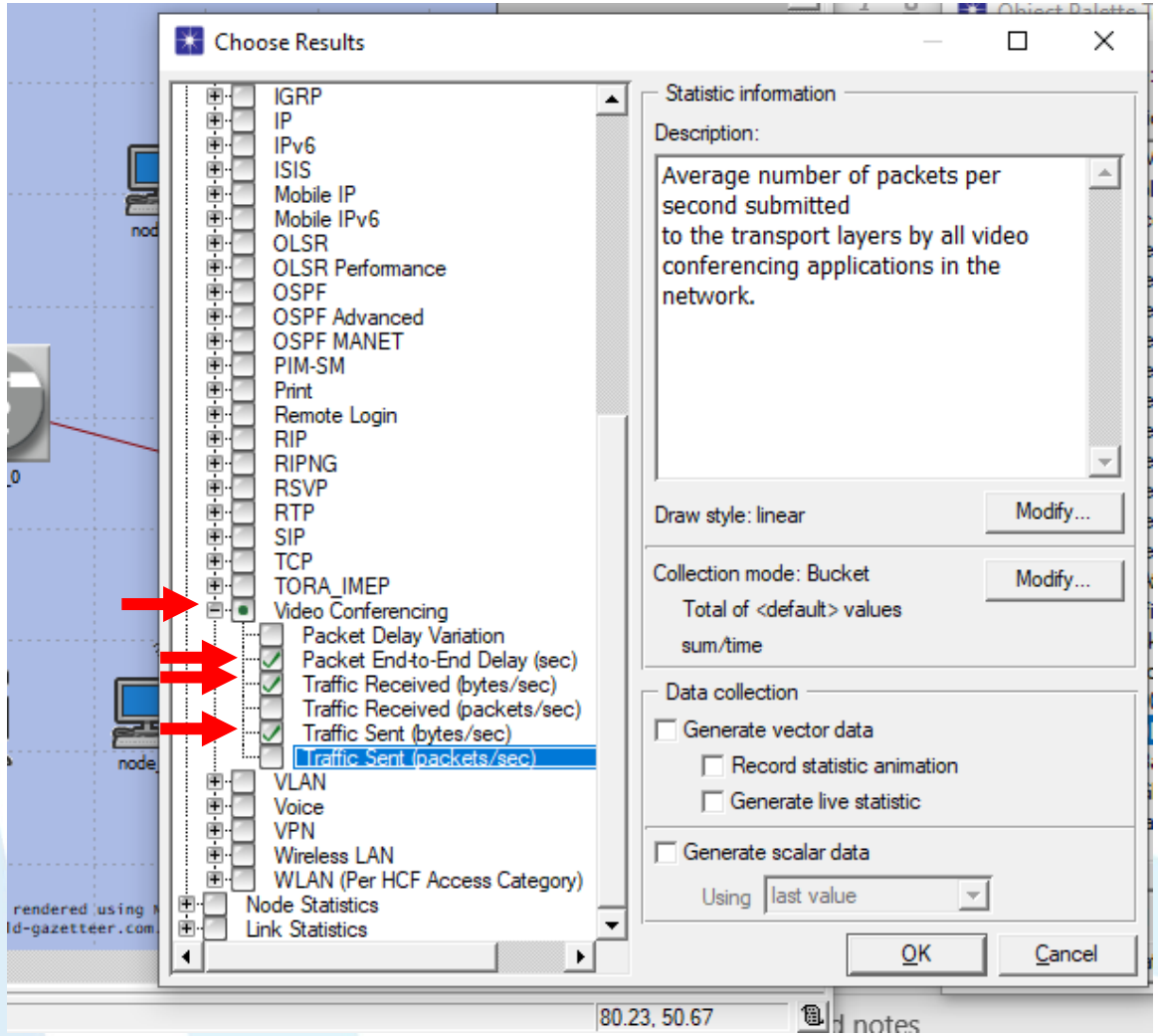



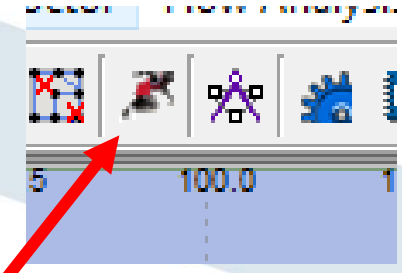

المطلوب نقل فيديو المستخدمين بمعدل 6Mbps لتحقيق ذلك يجب أن نجعل المخدم يولد إطارات الفيديو التي تحقق معدل النقل المطلوب، نفرض أن عدد الإطارات المولدة في الثانية الواحدة 30 إطار ولتحديد حجم الإطار من العلاقة التالية:

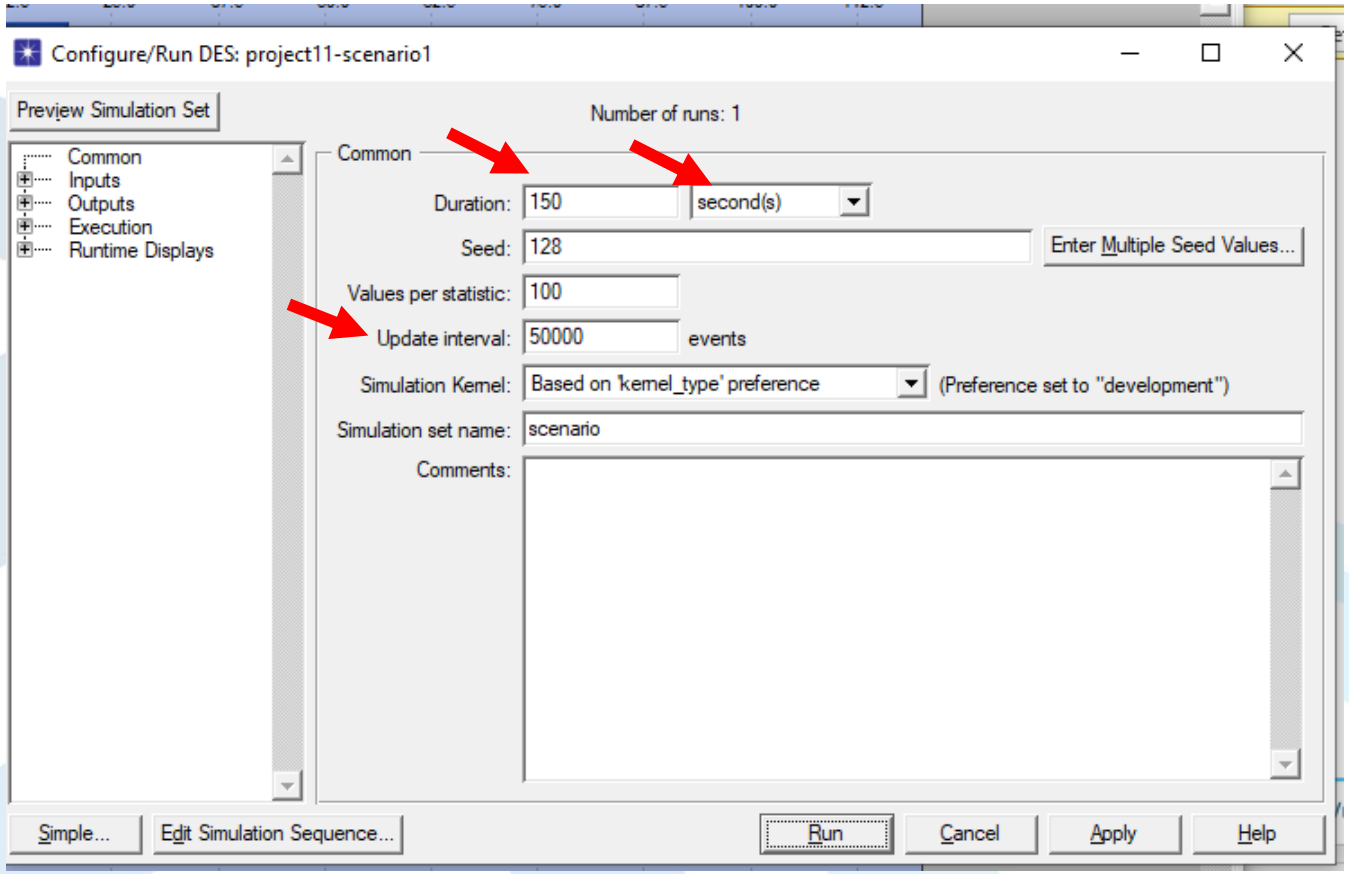
Frame size = given Mbps/8bits/ frames number/sec
Frame size =6Mbps/8bits/30frames/sec=25000 bytes

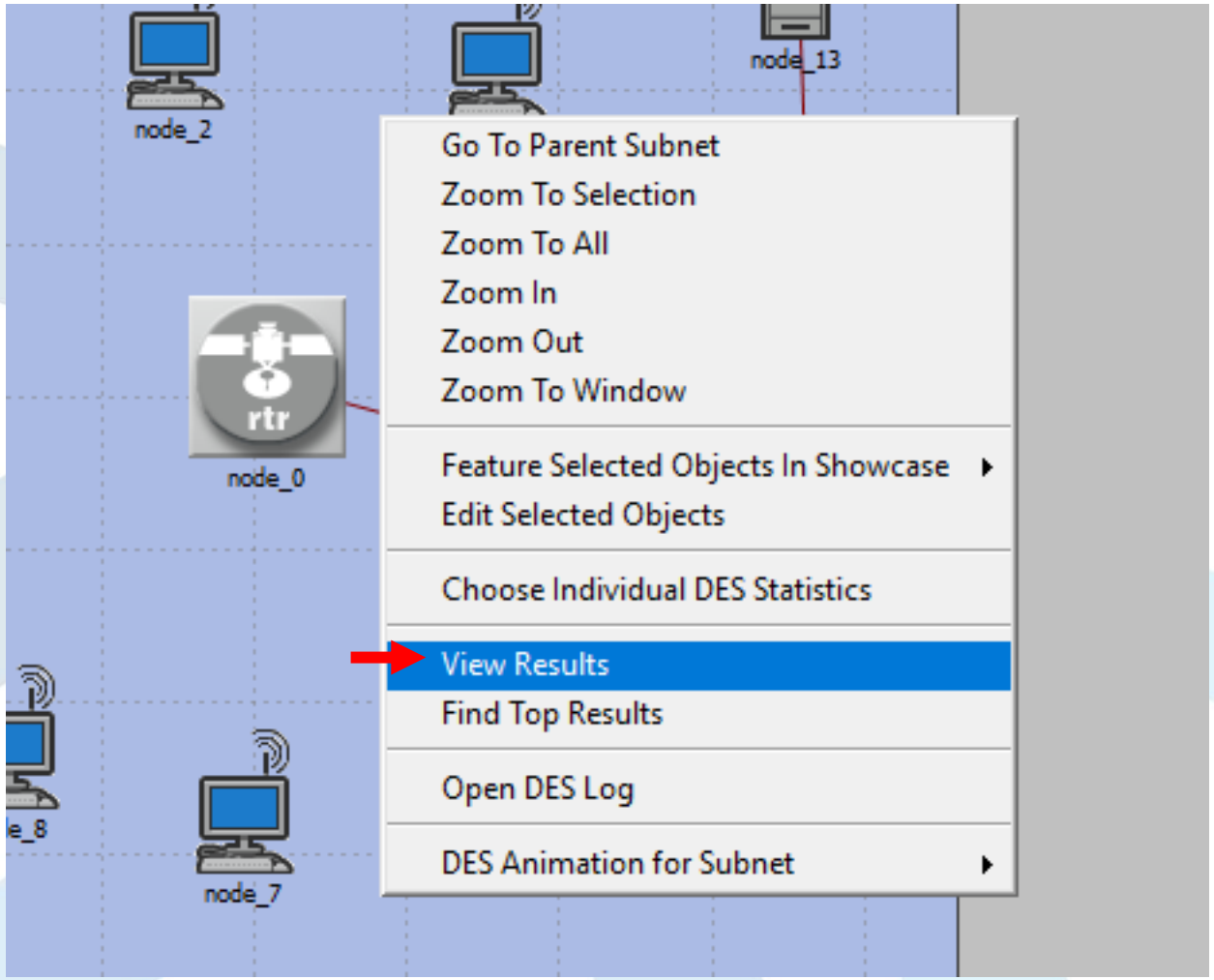


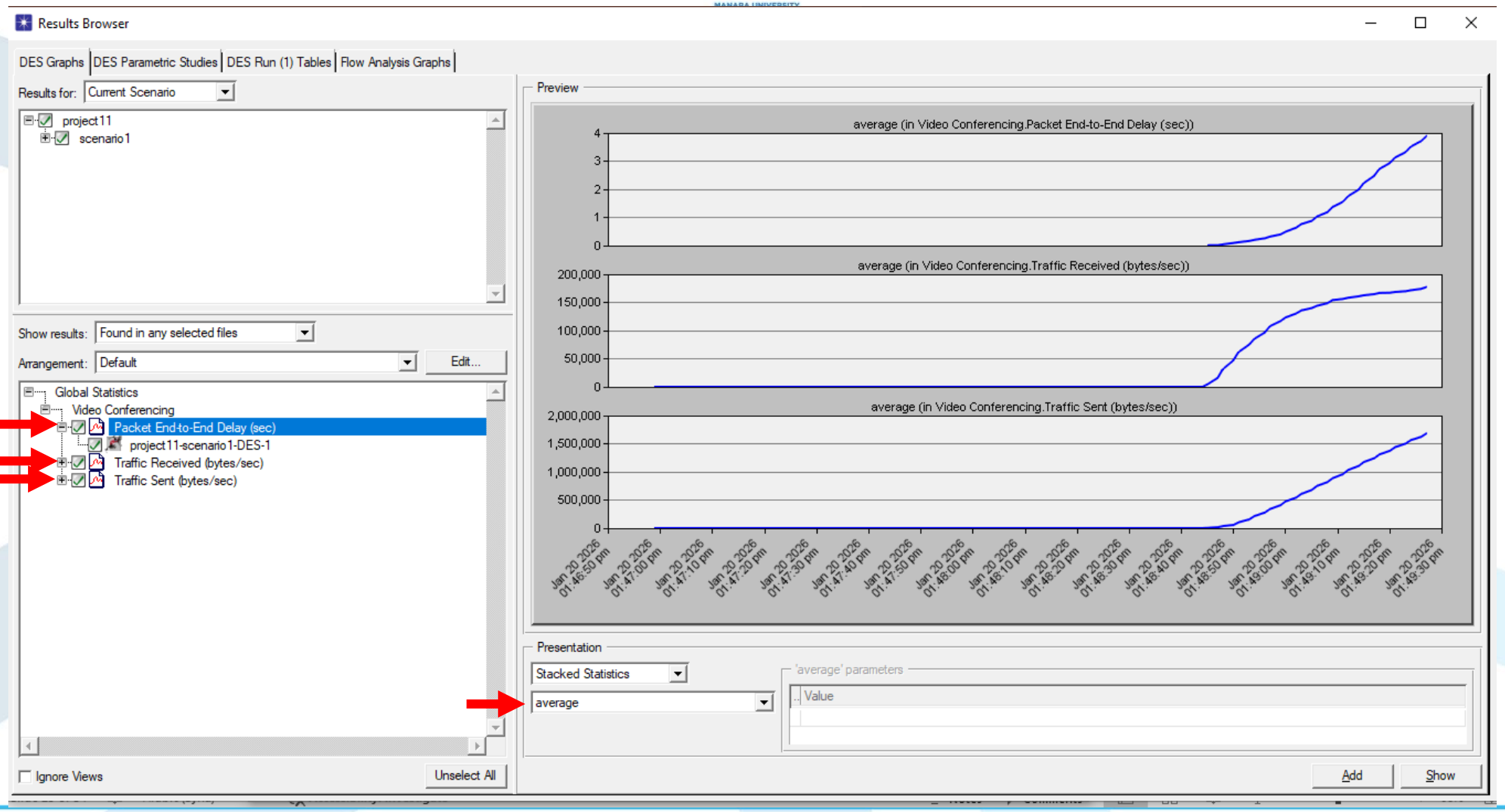

اختيار البارامترات المراد مقارنتها وإحصاء نتائجها خلال عملية المحاكاة




5
100.0
1


Configure/Run DES: project11-scenario1
Preview Simulation Set
Number of runs: 1
Common
Inputs
Outputs
Execution
Runtime Displays
Common
Duration: 150
second(s)
Seed: 128
Enter Multiple Seed Values...
Values per statistic: 100
Update interval: 50000
events
Simulation Kernel: Based on 'kernel_type' preference
(Preference set to "development")
Simulation set name: scenario
Comments:
Simple...
Edit Simulation Sequence...
Run
Cancel
Apply
Help


node_2
node_13
rtr
node_0
Go To Parent Subnet
Zoom To Selection
Zoom To All
Zoom In
Zoom Out
Zoom To Window
Feature Selected Objects In Showcase
Edit Selected Objects
Choose Individual DES Statistics
View Results
Find Top Results
Open DES Log
DES Animation for Subnet
node_7


Results Browser
DES Graphs
DES Parametric Studies
DES Run (1) Tables
Flow Analysis Graphs
Results for:
Current Scenario
project11
scenario1
Show results:
Found in any selected files
Arrangement:
Default
Edit...
Global Statistics
Video Conferencing
Packet End-to-End Delay (sec)
project11-scenario1-DES-1
Traffic Received (bytes/sec)
Traffic Sent (bytes/sec)
Ignore Views
Unselect All
Preview
average (in Video Conferencing.Packet End-to-End Delay (sec))
average (in Video Conferencing.Traffic Received (bytes/sec))
average (in Video Conferencing.Traffic Sent (bytes/sec))
Presentation
Stacked Statistics
average
'average' parameters
Value
Add
Show

# Thanks for Listening