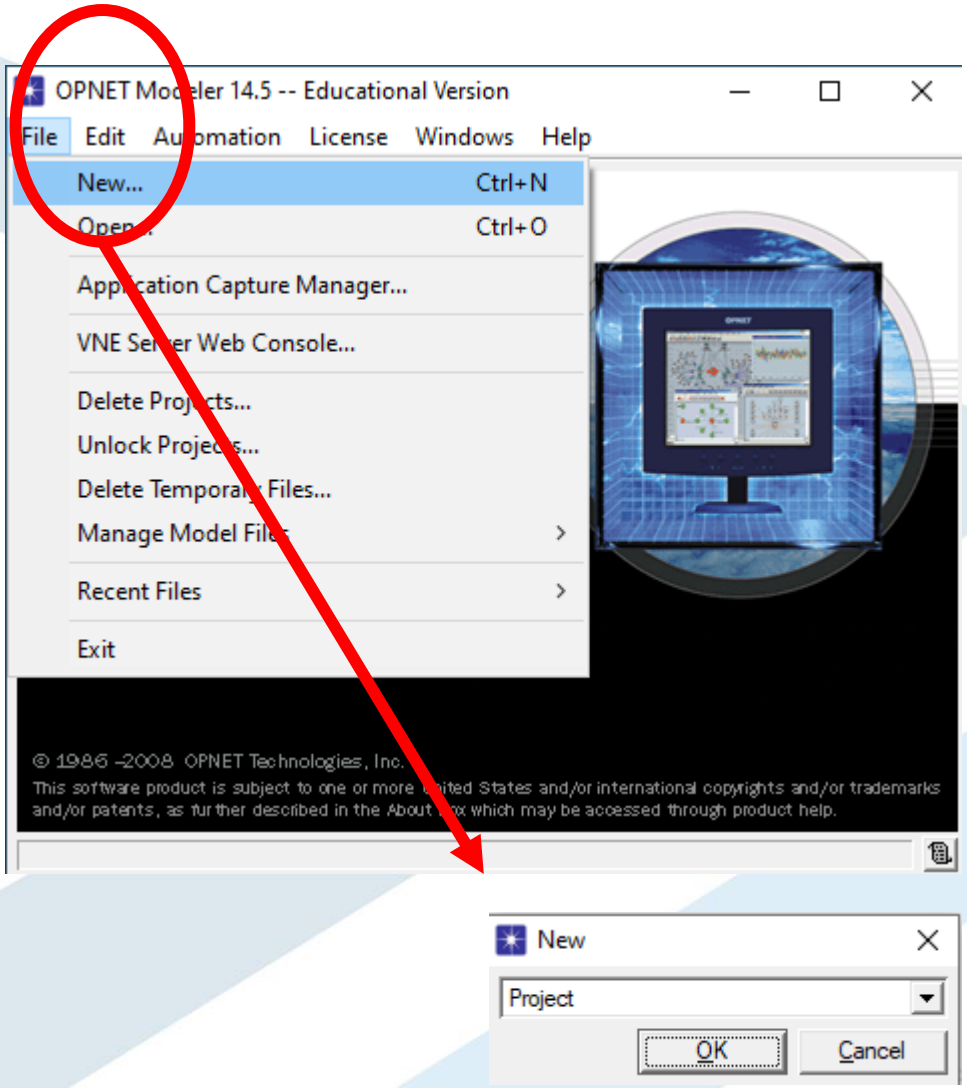
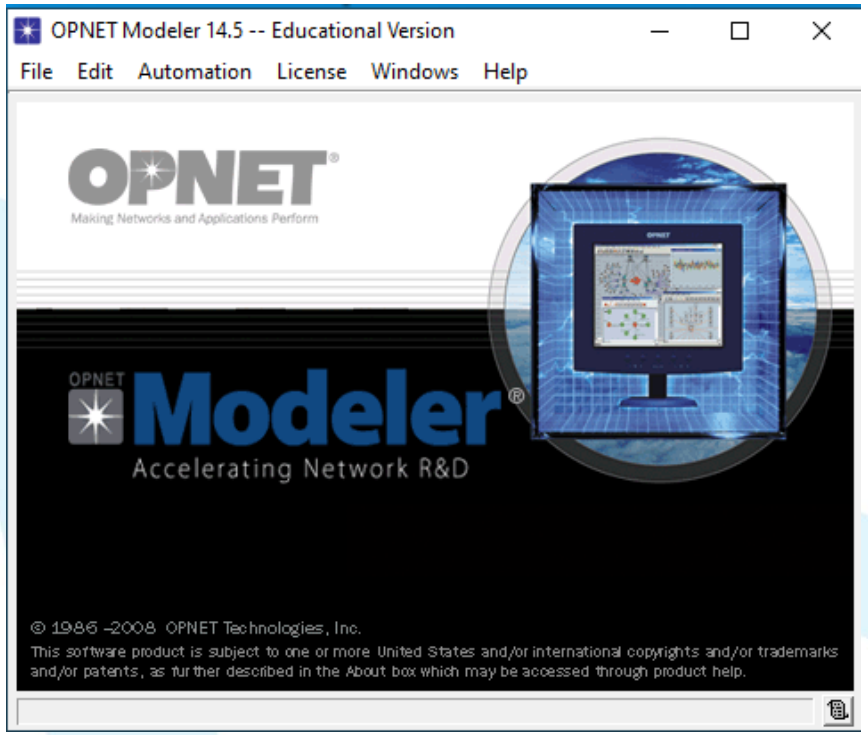
CEMC606: Industrial Networks

Lecture 5: Wireless LAN Networks-2

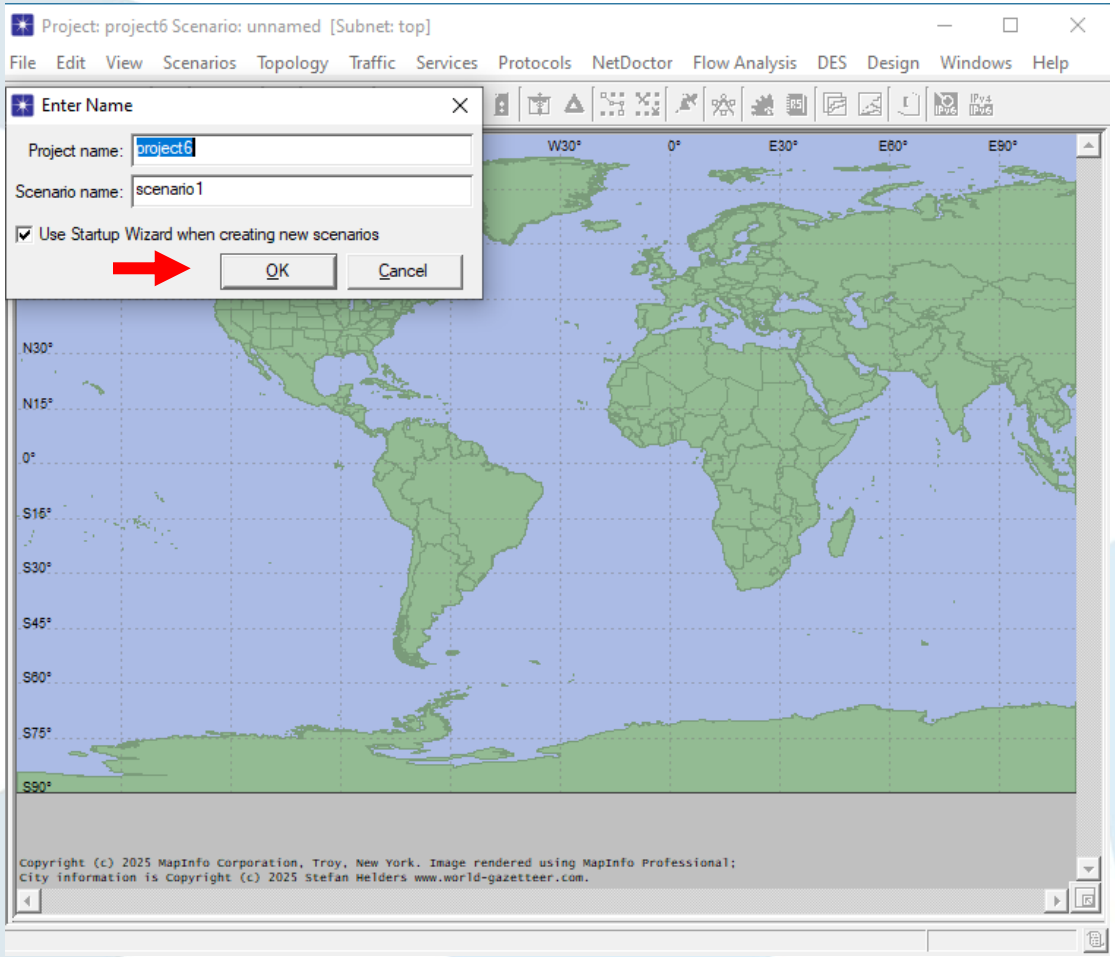
Eng. Aya Kherbek
Eng. Baher Kherbek
Faculty of Engineering
Department of Mechatronics
Manara University

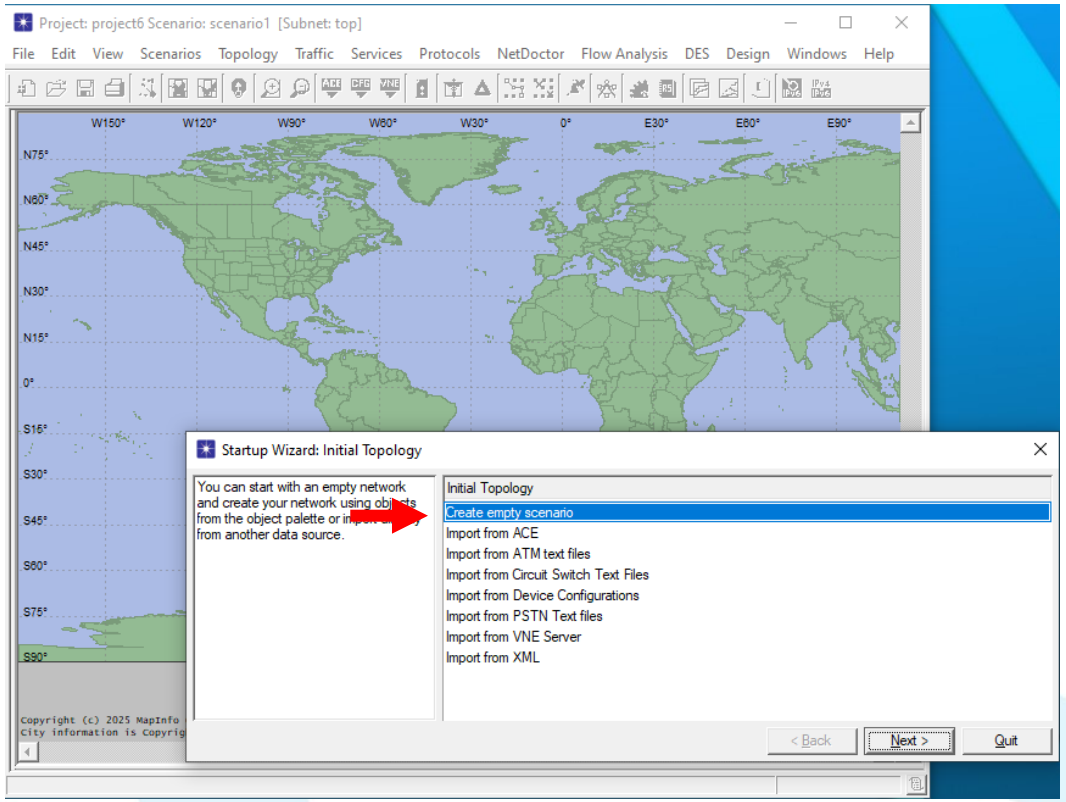
بداية نبدأ بفتح واجهة البرنامج الأساسية لإنشاء ملف جديد فتكون كما يلي

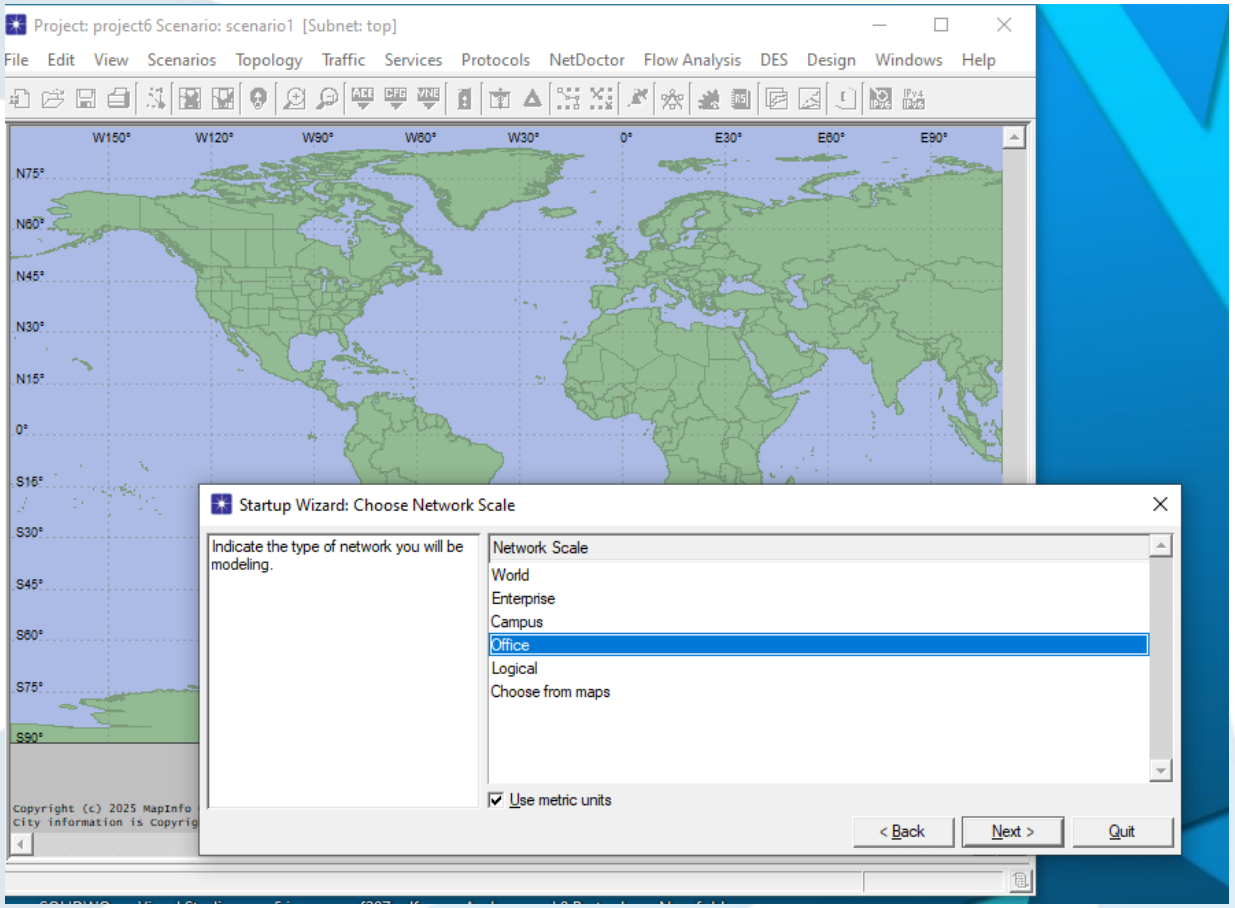




نقوم بإنشاء مشروع جديد ثم نختار إنشاء سيناريو فارغ لتوصيف مسألة العمل بداخلها





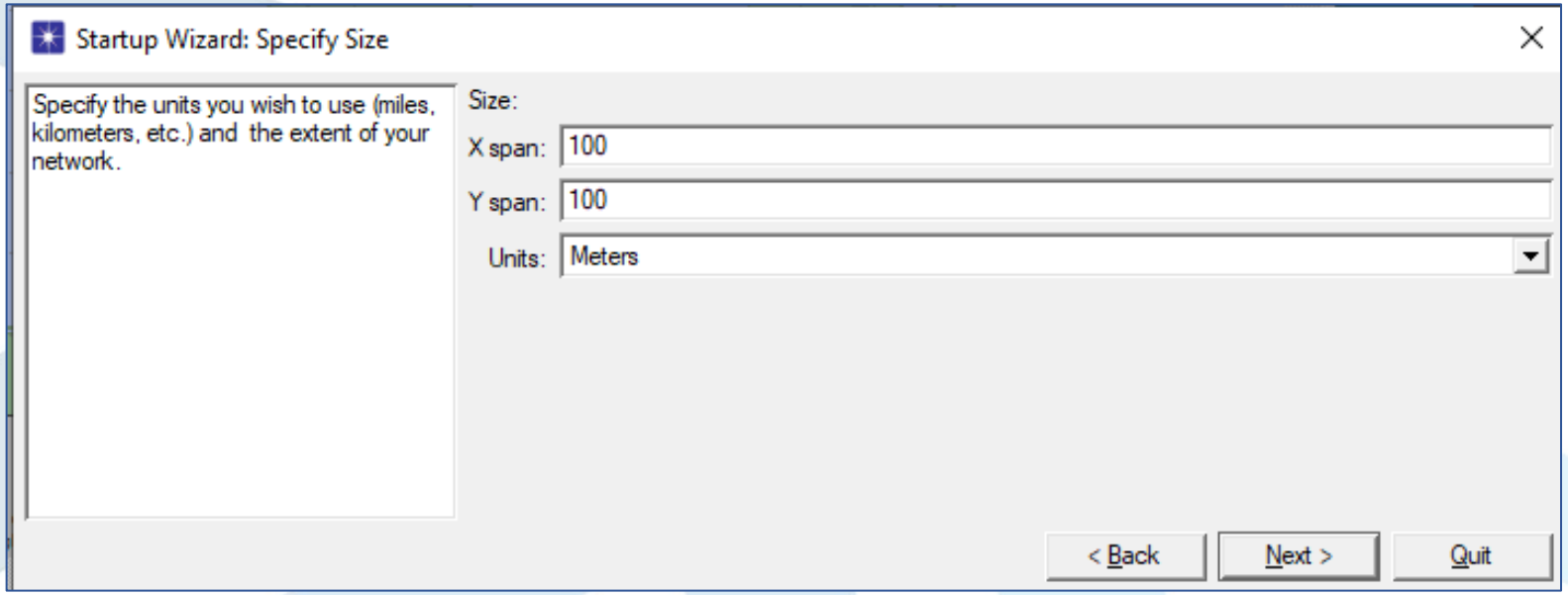


بعدها نختار حجم المكان الذي تمتد عليه الشبكة وفي حالتنا سنعمل على مساحة مكتب

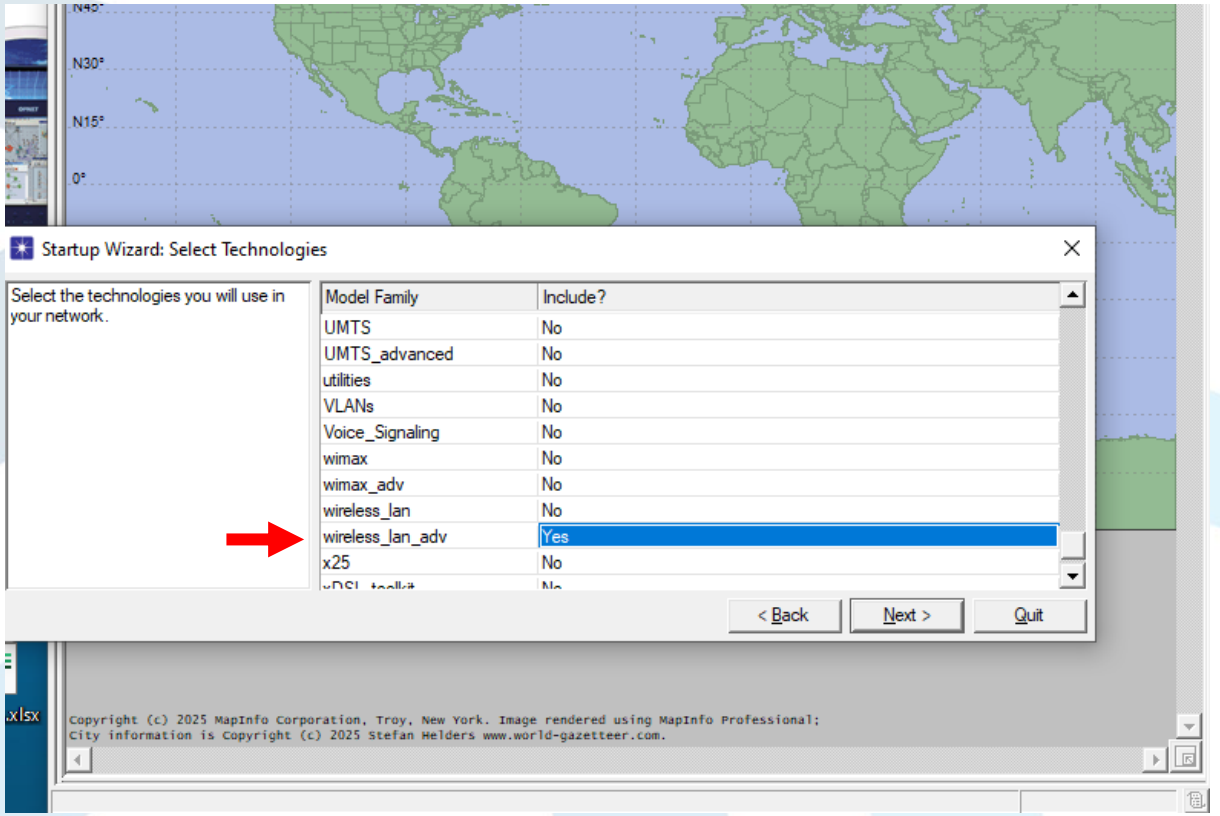
تمرين – تحليل أداء الشبكات اللاسلكية

قم بإنشاء شبكة لاسلكية محلية تمتد على مساحة جغرافية 100 متر على المحور x و 100 مترعلى المحور y بحيث تتكون الشبكة من 13 حاسوب موصول مع نقطة الوصول الأولى 6 و الثانية 7 حواسيب مع الأخذ بعين الاعتبار التوصيلات بين السيرفر و نقطة الوصول و السويتش بالإضافة إلى أن الكابلات من نوع كابلات محورية.
الشبكة المحلية تعمل على المعيار g802.11 نفعل لكل المستخدمين في الشبكة التطبيق File Transfer
البارمترات التي سوف يتم دراستها هي كالتالي:
- Throughput (bits/sec).
- التأخير Delay(sec) ضمن wireless lan.
وناقش ما يلي:
بالنظر للتأخير ماذا تستنتج؟ - إذا علمت أن مدة المحاكاة 30 دقيقة، وأن الطرفيات غير متحركة

المساحة التي تتوزع عليها شبكة المكتب



اختيار تكنولوجيا النقل wireless_lan_adv



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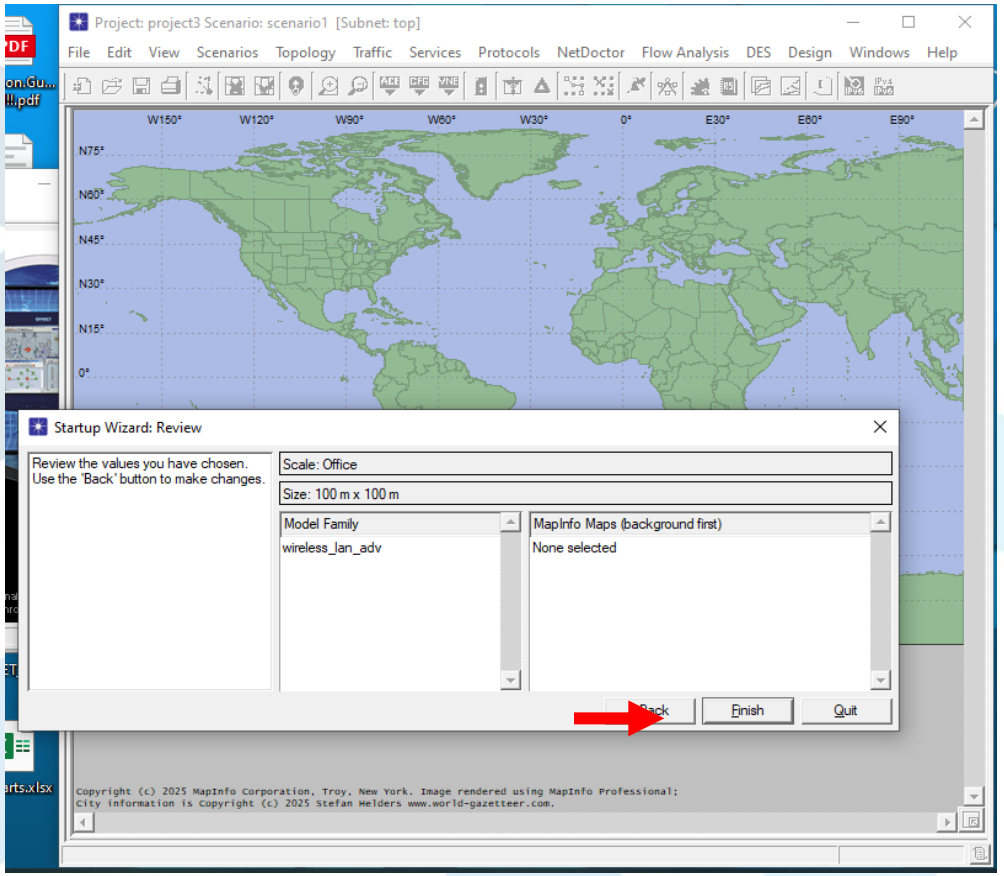
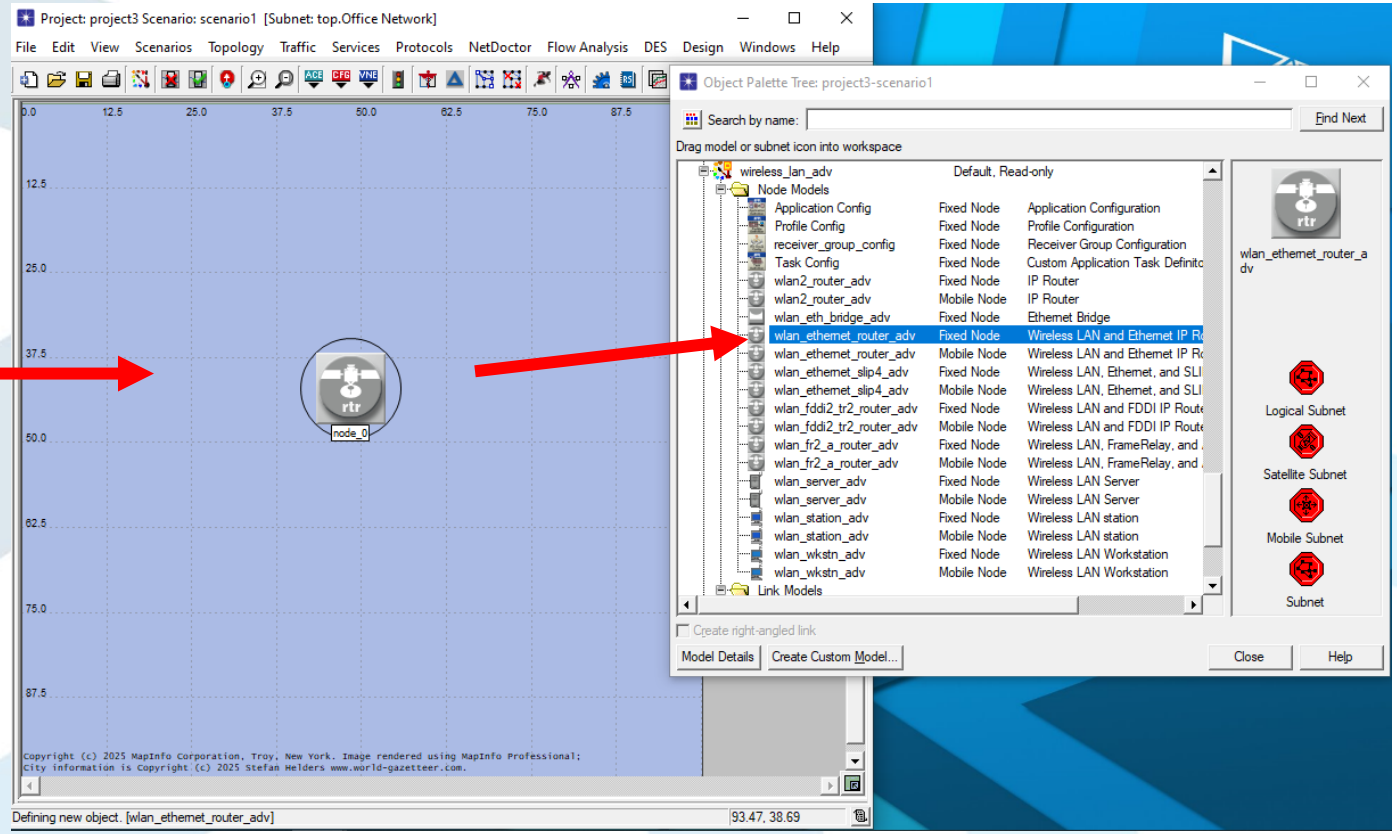
إنـهاء إعداد بيانـات الشبكة الأساسية



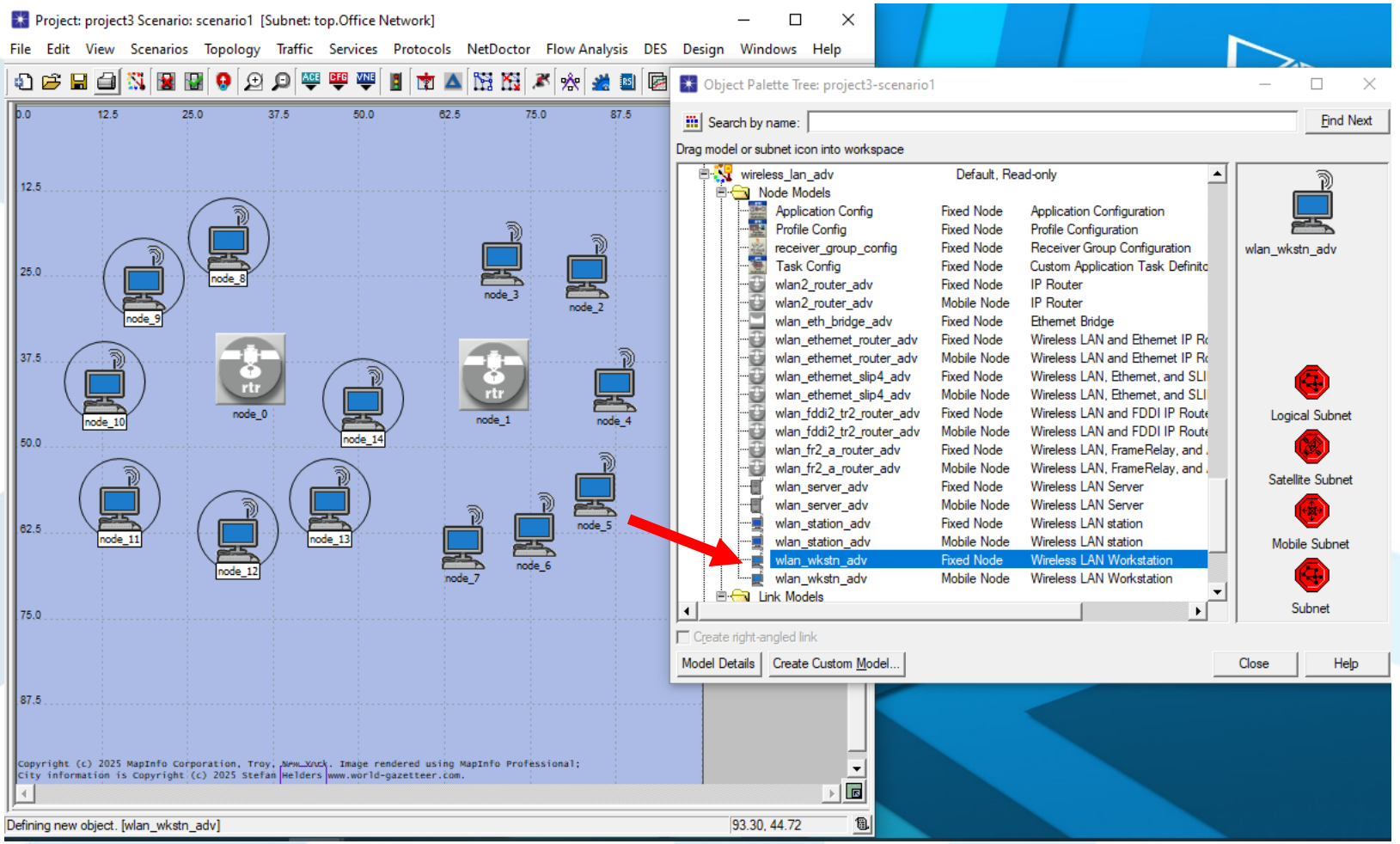
مساحة العمل الأساسية لبدء تصميم الشبكة مع شجرة العناصر

نقطة الوصول router



نضع معرفات الشبكة وتجهيزاتها المرغوبة هنا

نختار Workstations من نمط fixed بحيث تكون ثابتة في مكانها



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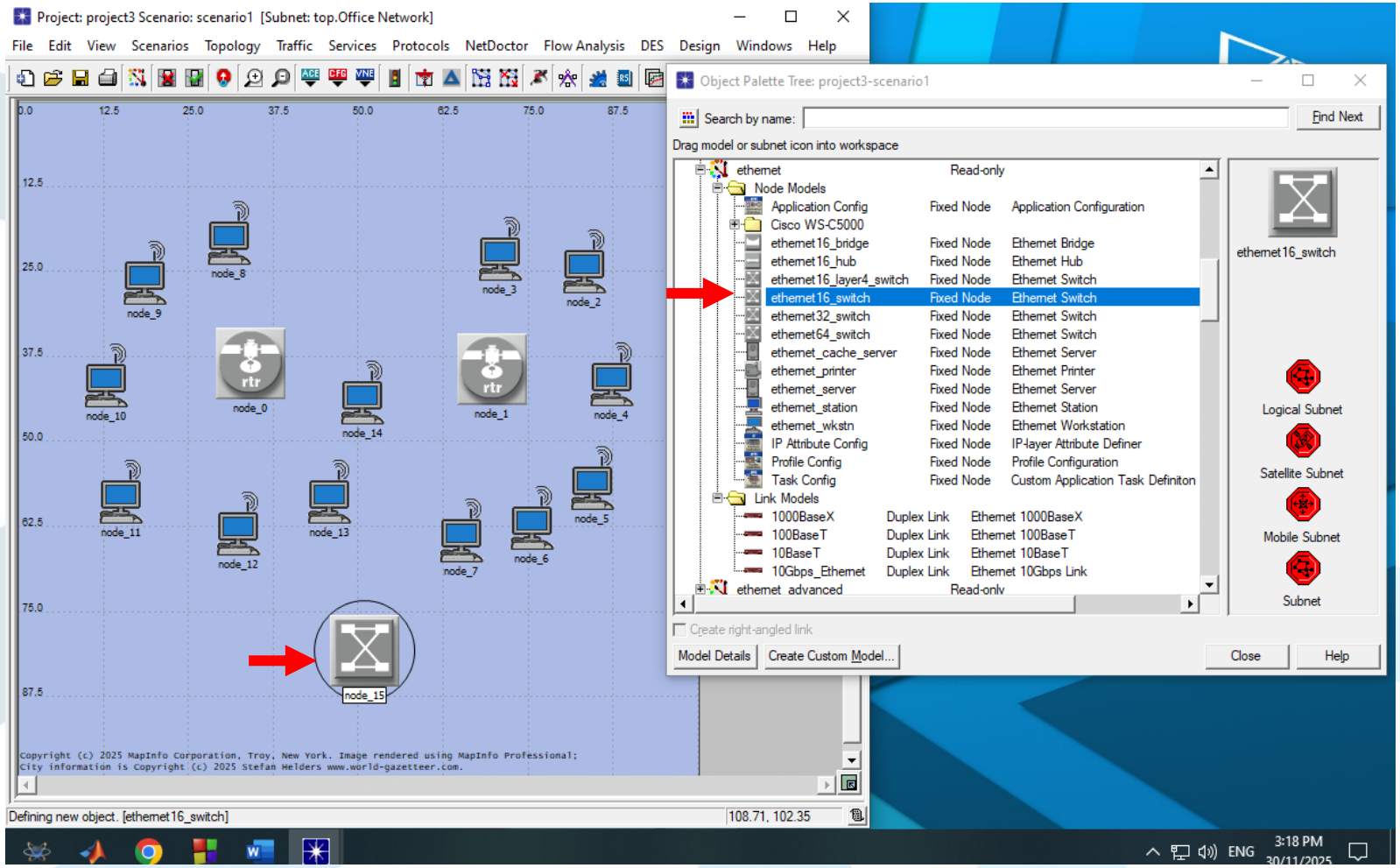
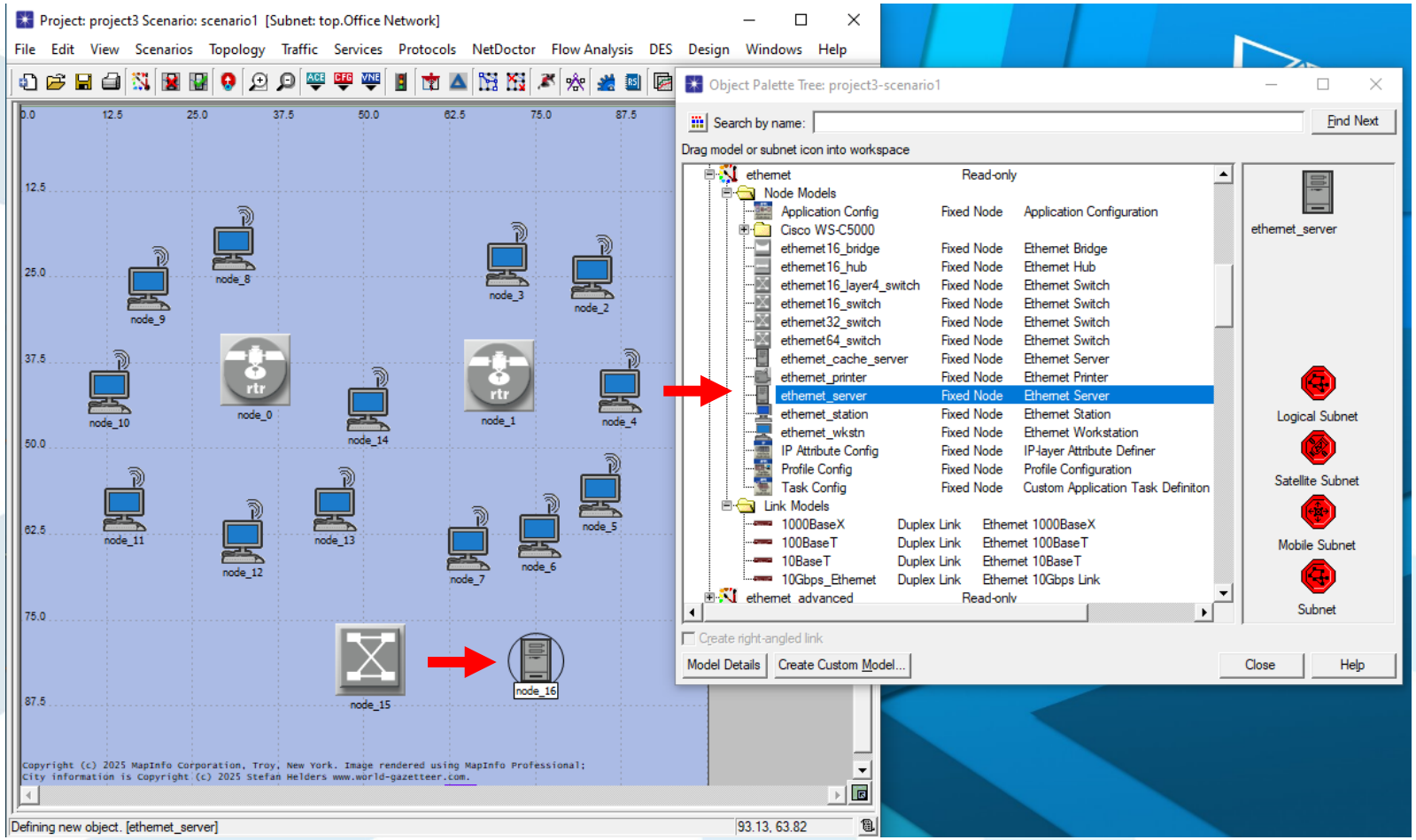
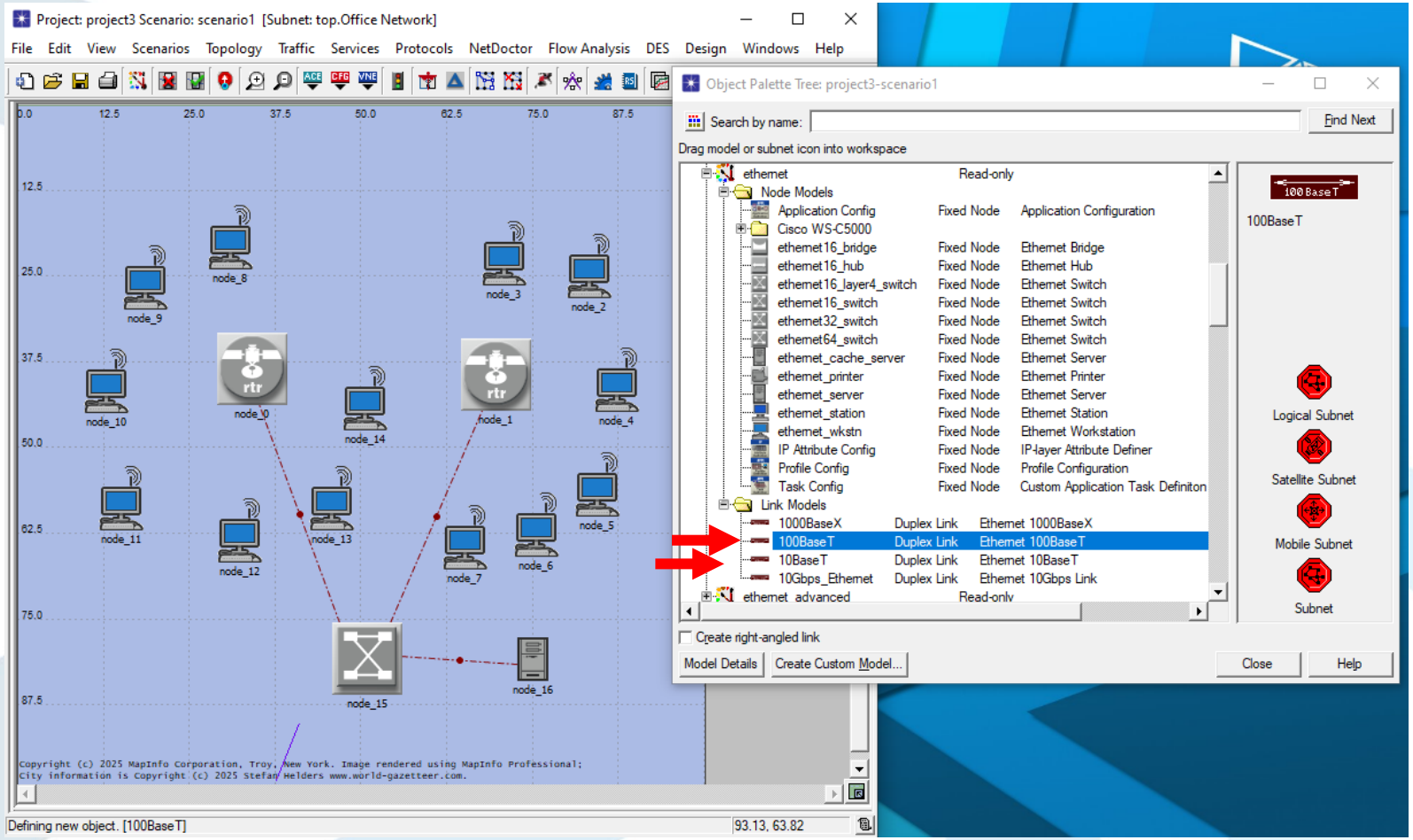
Switch لربط نقاط الوصول مع السيرفر



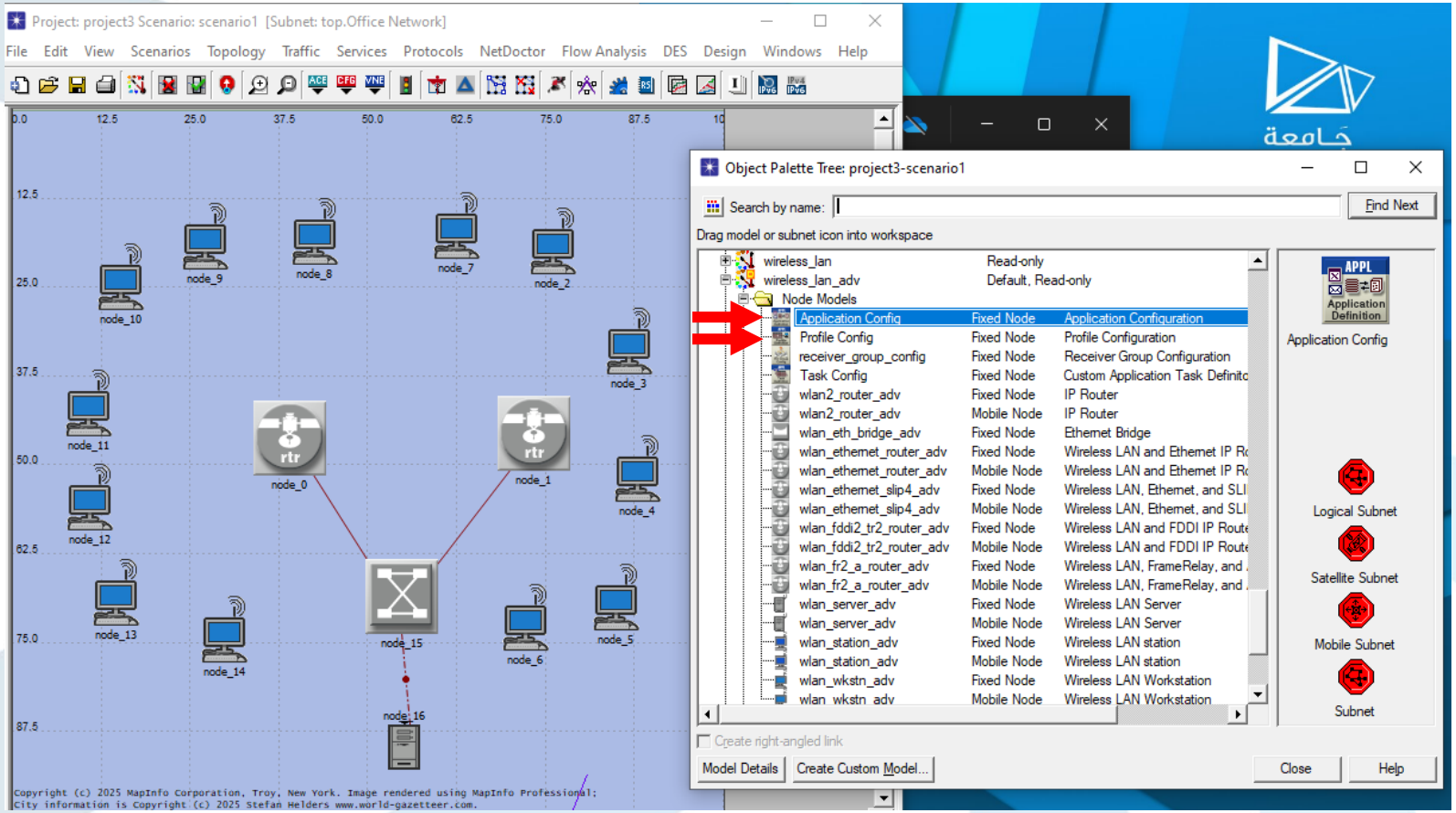
Switch نختاره من قائمة ethernet في شجرة الأدوات



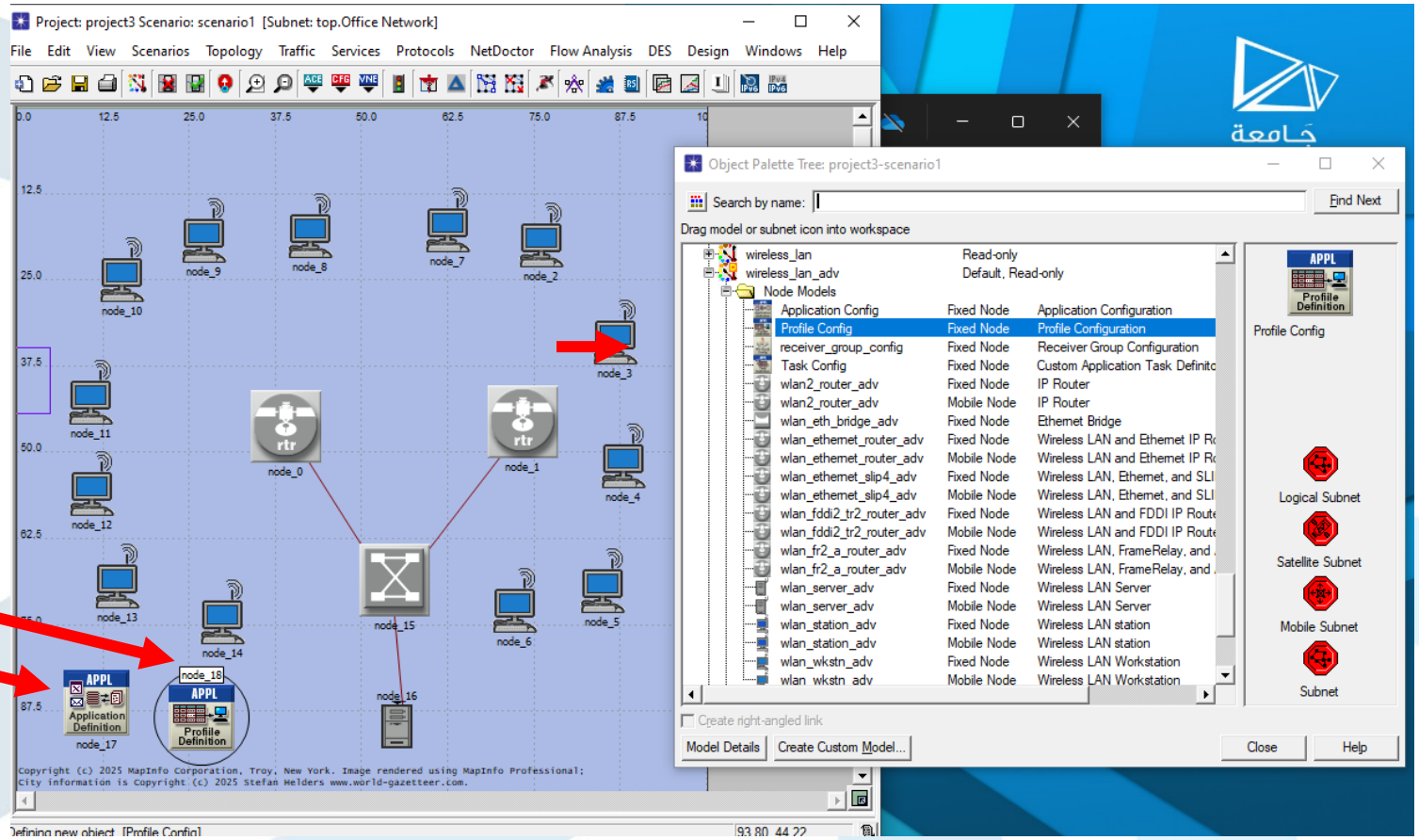
نختار السيرفر
اذي سنقوم
بتفعيل البروفايل
عليه و التطبيق

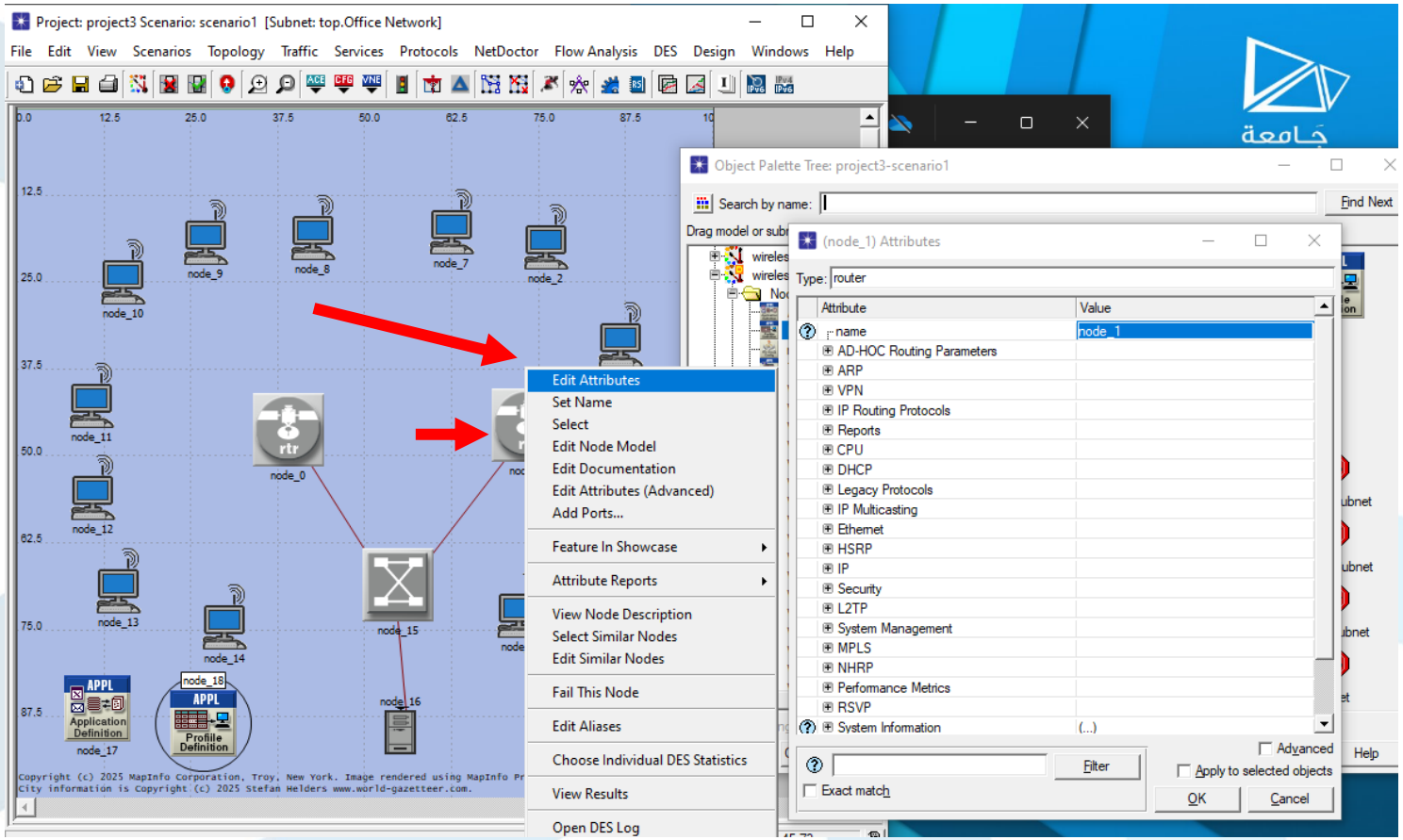


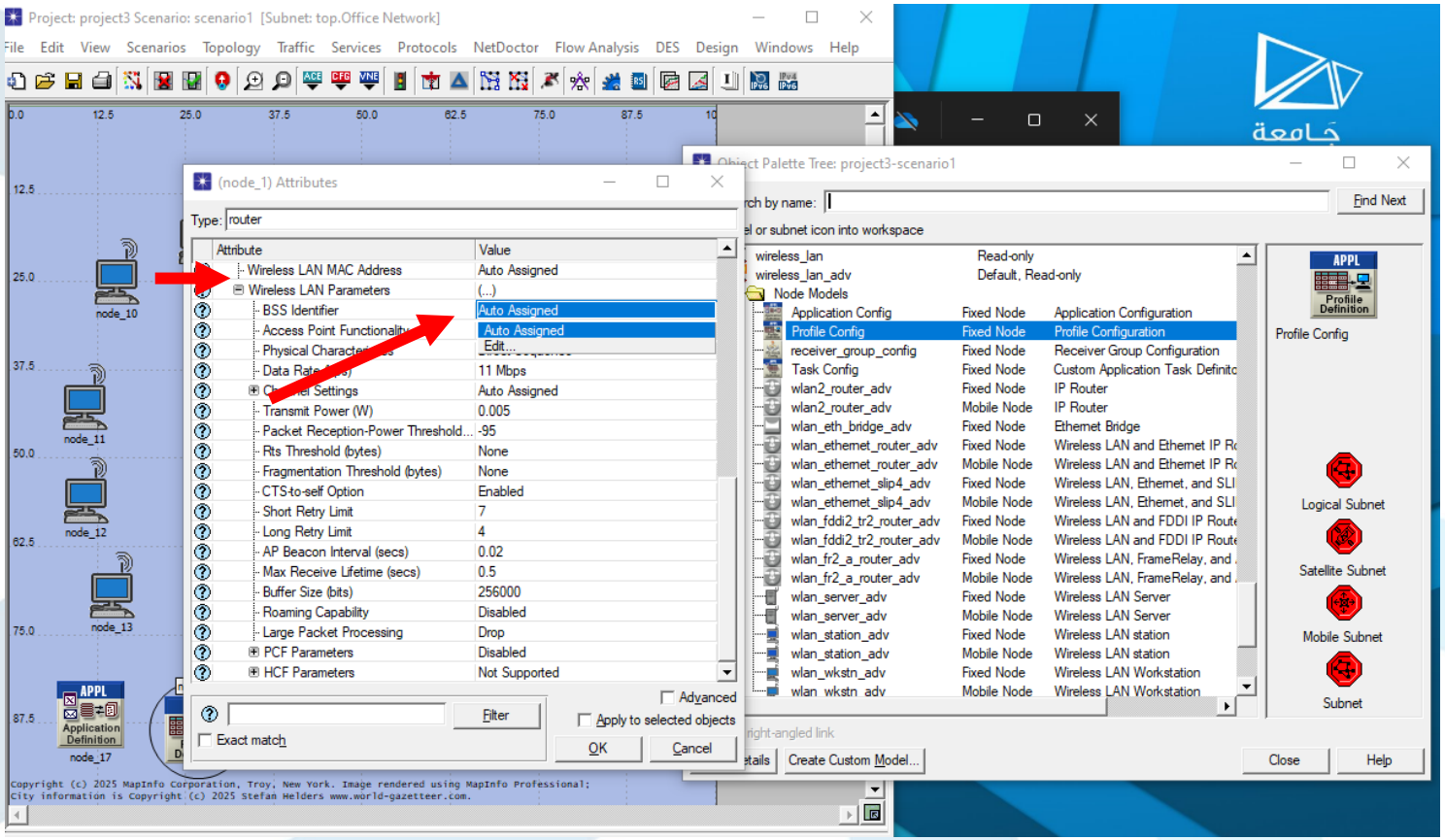
نصل كل من الراوترات مع ال switch و الـ switch مع السيرفر باستخدام وصلات 100BaseT



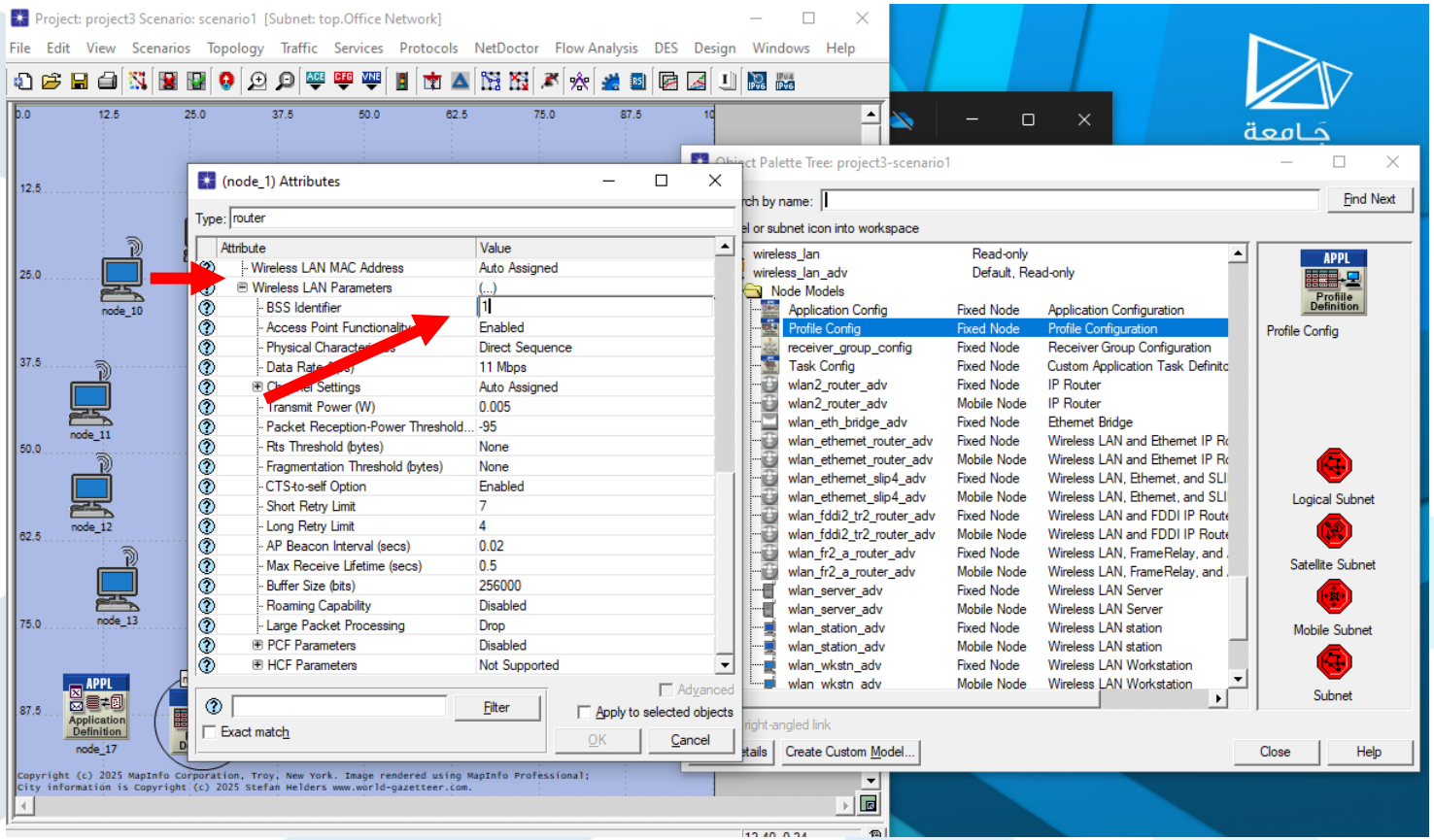
ثم نختار معرفات البروفايل و التطبيق من شجرة wirless_lan_adv


Project: project3 Scenario: scenario1 [Subnet: top.Office Network]
File Edit View Scenarios Topology Traffic Services Protocols NetDoctor Flow Analysis DES Design Windows Help
Object Palette Tree: project3-scenario1
Search by name:
Find Next
Drag model or subnet icon into workspace
wireless_lan Read-only
wireless_lan_adv Default, Read-only
Node Models
Application Config Fixed Node Application Configuration
Profile Config Fixed Node Profile Configuration
receiver_group_config Fixed Node Receiver Group Configuration
Task Config Fixed Node Custom Application Task Definitc
wlan2_router_adv Fixed Node IP Router
wlan2_router_adv Mobile Node IP Router
wlan_eth_bridge_adv Fixed Node Ethernet Bridge
wlan_ethernet_router_adv Fixed Node Wireless LAN and Ethernet IP R
wlan_ethernet_router_adv Mobile Node Wireless LAN and Ethernet IP R
wlan_ethernet_slip4_adv Fixed Node Wireless LAN, Ethernet, and SLI
wlan_ethernet_slip4_adv Mobile Node Wireless LAN, Ethernet, and SLI
wlan_fddi2_tr2_router_adv Fixed Node Wireless LAN and FDDI IP Route
wlan_fddi2_tr2_router_adv Mobile Node Wireless LAN and FDDI IP Route
wlan_fr2_a_router_adv Fixed Node Wireless LAN, FrameRelay, and
wlan_fr2_a_router_adv Mobile Node Wireless LAN, FrameRelay, and
wlan_server_adv Fixed Node Wireless LAN Server
wlan_server_adv Mobile Node Wireless LAN Server
wlan_station_adv Fixed Node Wireless LAN station
wlan_station_adv Mobile Node Wireless LAN station
wlan_wkstn_adv Fixed Node Wireless LAN Workstation
wlan_wkstn_adv Mobile Node Wireless LAN Workstation
Create right-angled link
Model Details
Create Custom Model...
Close
Help
Profile Config
Logical Subnet
Satellite Subnet
Mobile Subnet
Subnet
node_0
node_1
node_2
node_3
node_4
node_5
node_6
node_7
node_8
node_9
node_10
node_11
node_12
node_13
node_14
node_15
node_16
node_17
node_18
Application Definition
Profile Definition
Copyright (c) 2025 MapInfo Corporation, Troy, New York. Image rendered using MapInfo Professional;
City information is Copyright (c) 2025 Stefan Helders www.world-gazetteer.com.

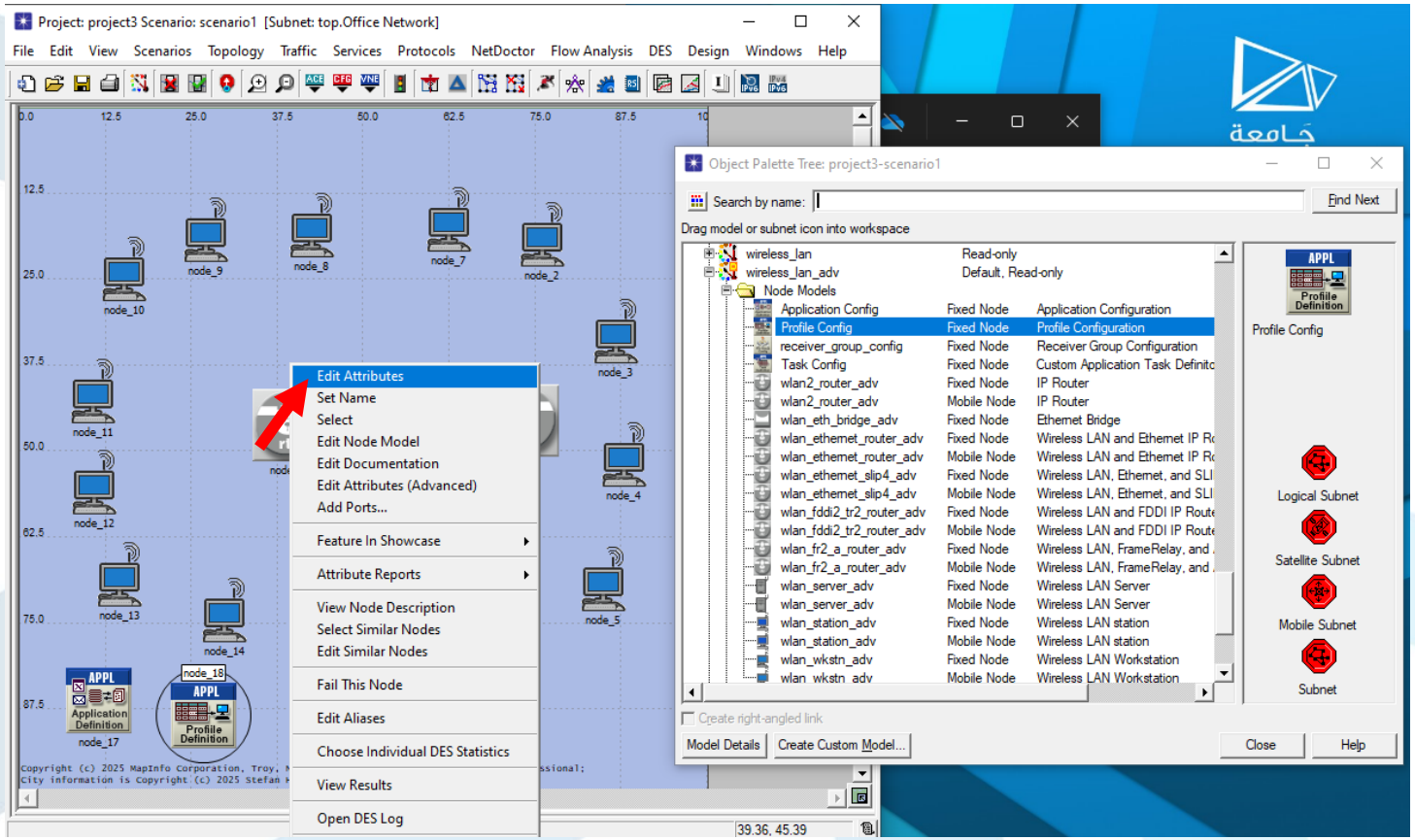

Project: project3 Scenario: scenario1 [Subnet: top.Office Network]
File Edit View Scenarios Topology Traffic Services Protocols NetDoctor Flow Analysis DES Design Windows Help
Object Palette Tree: project3-scenario1
Search by name:
Find Next
(node_1) Attributes
Type: router
Attribute
Value
name
node_1
AD-HOC Routing Parameters
ARP
VPN
IP Routing Protocols
Reports
CPU
DHCP
Legacy Protocols
IP Multicasting
Ethernet
HSRP
IP
Security
L2TP
System Management
MPLS
NHRP
Performance Metrics
RSVP
System Information
(...)
Filter
Exact match
Advanced
Apply to selected objects
OK
Cancel
Edit Attributes
Set Name
Select
Edit Node Model
Edit Documentation
Edit Attributes (Advanced)
Add Ports...
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
Open DES Log
node_0
node_1
node_2
node_7
node_8
node_9
node_10
node_11
node_12
node_13
node_14
node_15
node_16
node_17
node_18
APPL
Application Definition
Profile Definition
rtr



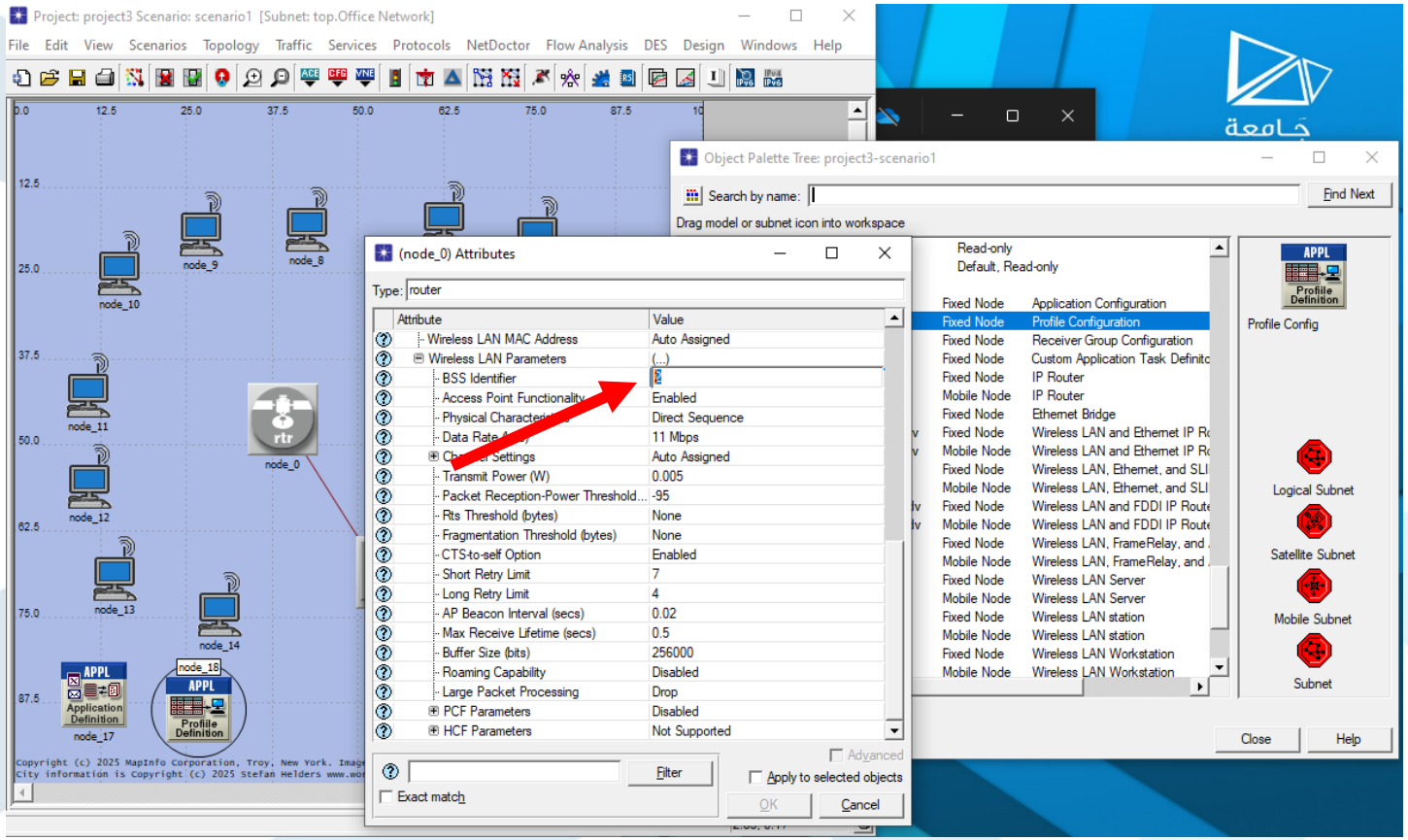
علينا تعريف BSS معين لنقطة الوصول حتى نعرف الأجهزة الموصولة على هذا الراوتر بقيمة المعرف



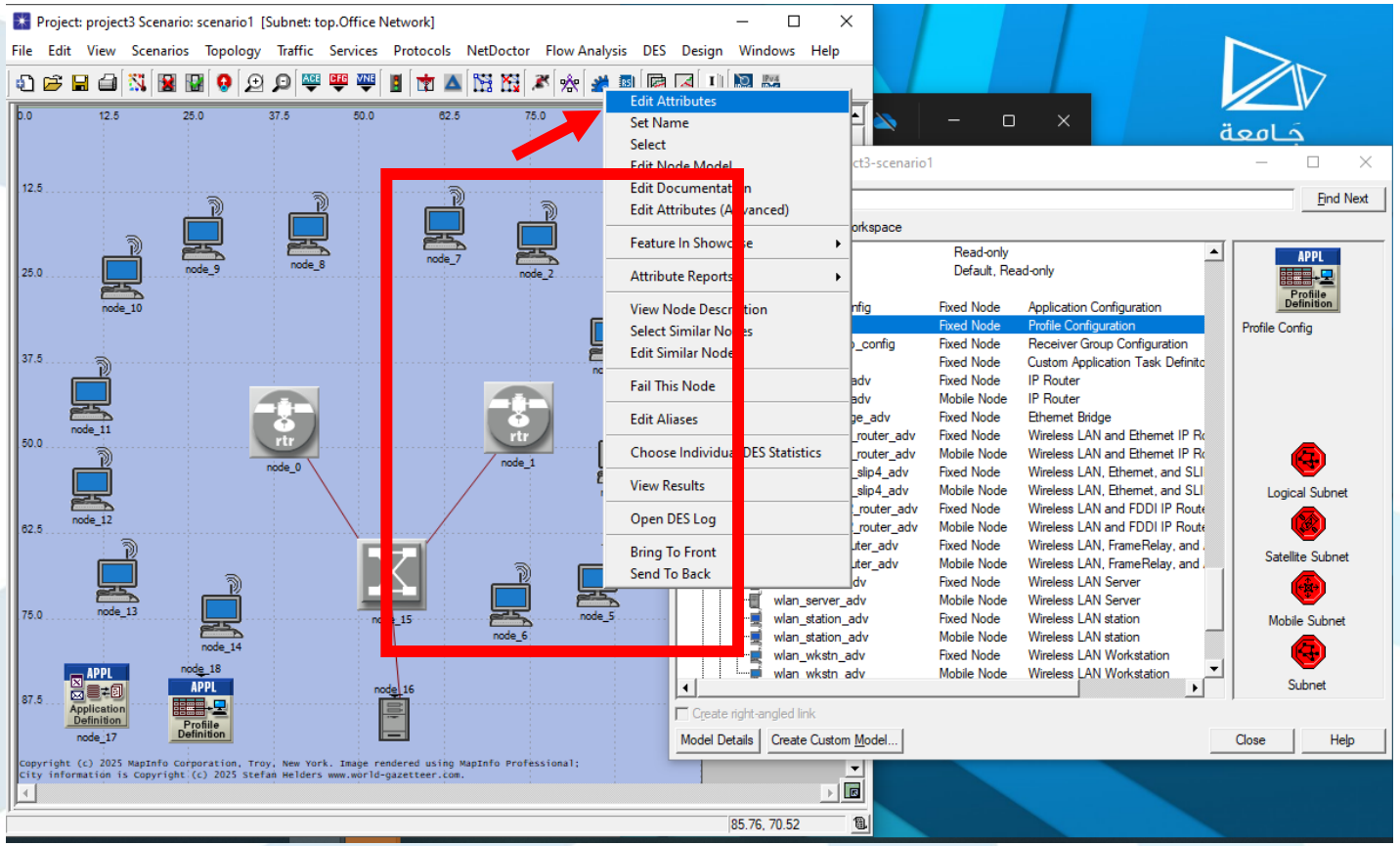
نعطيه قيمة 1
للراوتر الأول


Project: project3 Scenario: scenario1 [Subnet: top.Office Network]
File Edit View Scenarios Topology Traffic Services Protocols NetDoctor Flow Analysis DES Design Windows Help
Edit Attributes
Set Name
Select
Edit Node Model
Edit Documentation
Edit Attributes (Advanced)
Add Ports...
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
Open DES Log
Object Palette Tree: project3-scenario1
Search by name:
Find Next
Drag model or subnet icon into workspace
wireless_lan
wireless_lan_adv
Node Models
Application Config
Profile Config
receiver_group_config
Task Config
Create right-angled link
Model Details
Create Custom Model...
Close
Help
Logical Subnet
Satellite Subnet
Mobile Subnet
Subnet

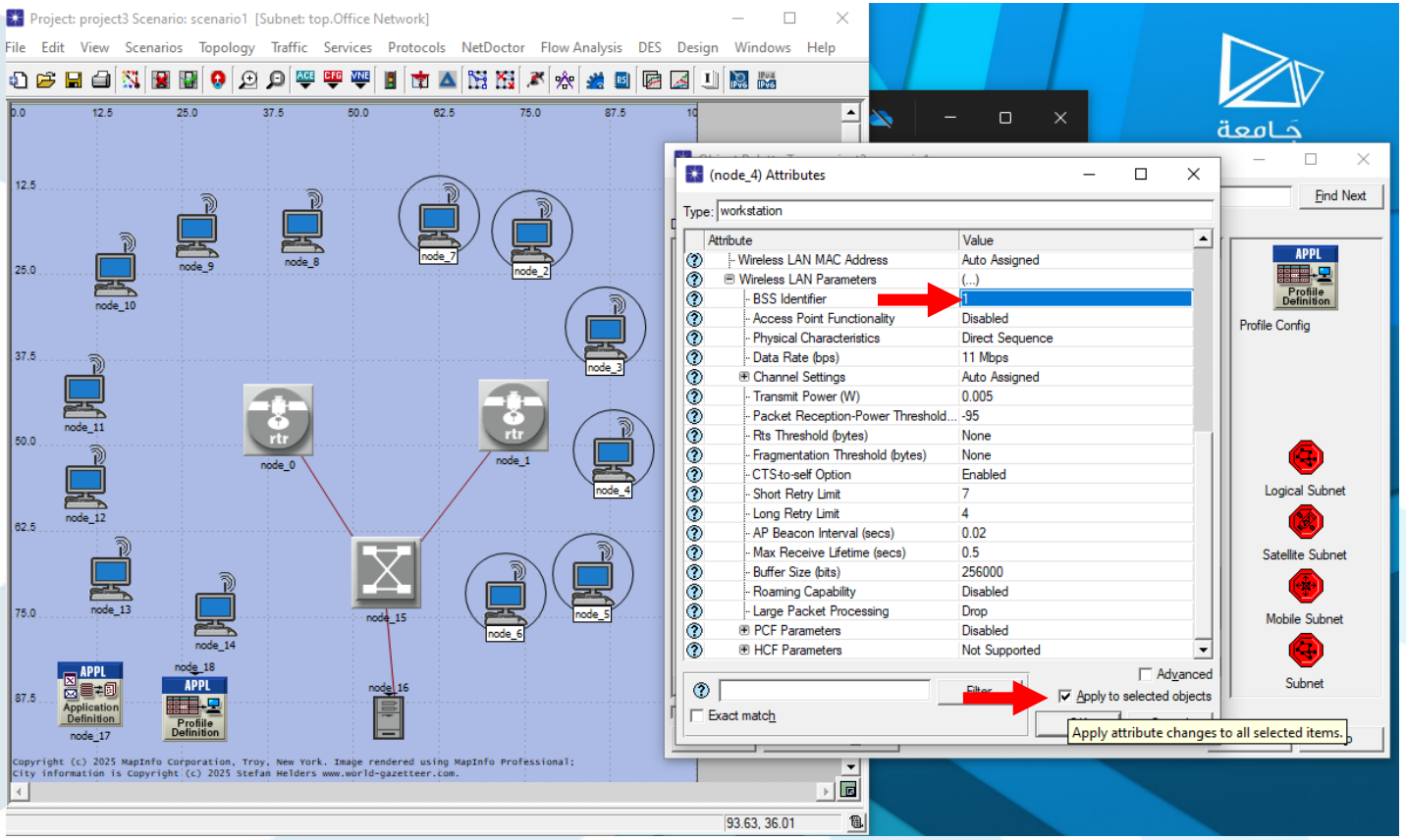
الراوتر 2



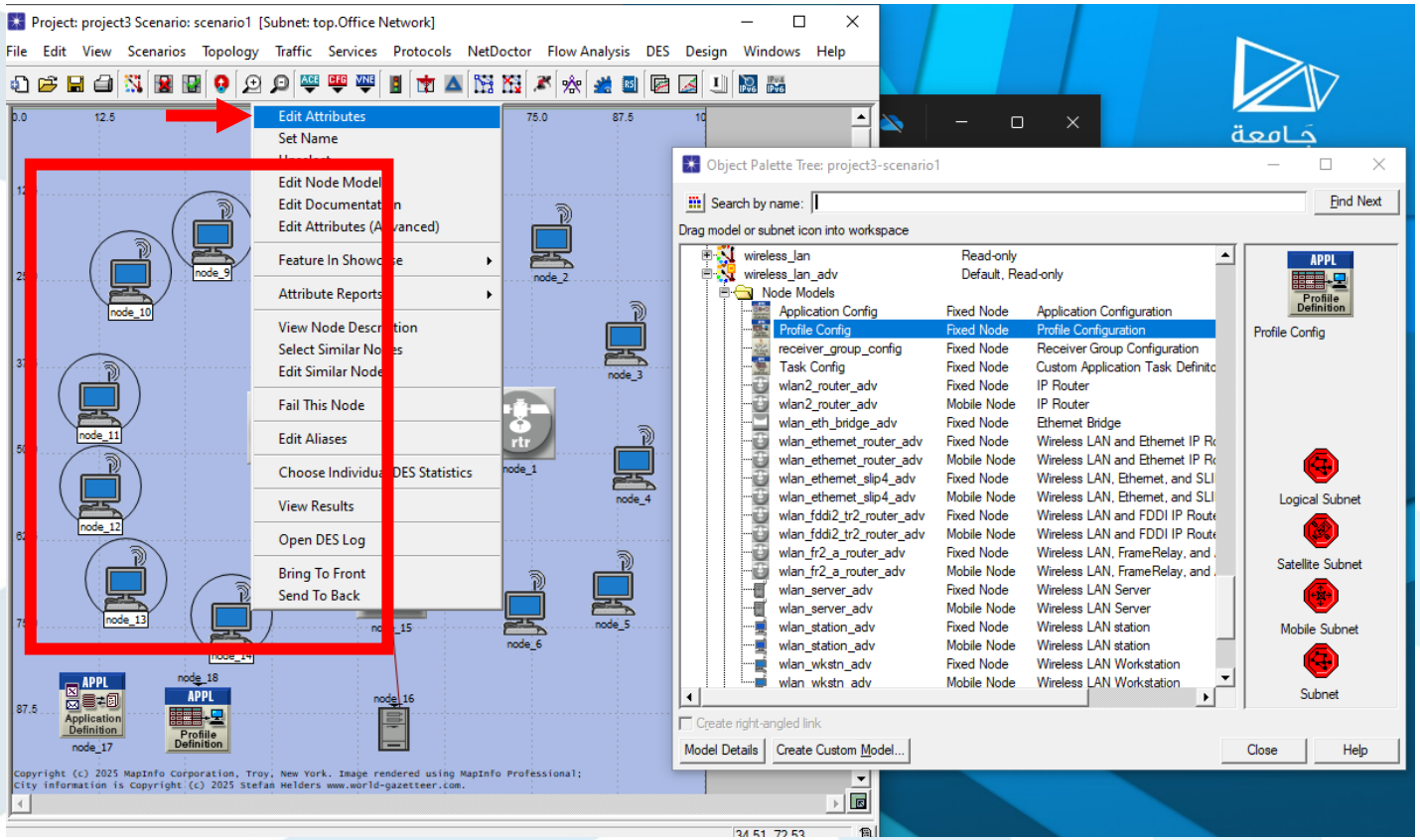
علينا تعريف BSS معين لنقطة الوصول حتى نعرف الأجهزة الموصولة على هذا الراوتر بقيمة المعرف وهنا نعرفه 2



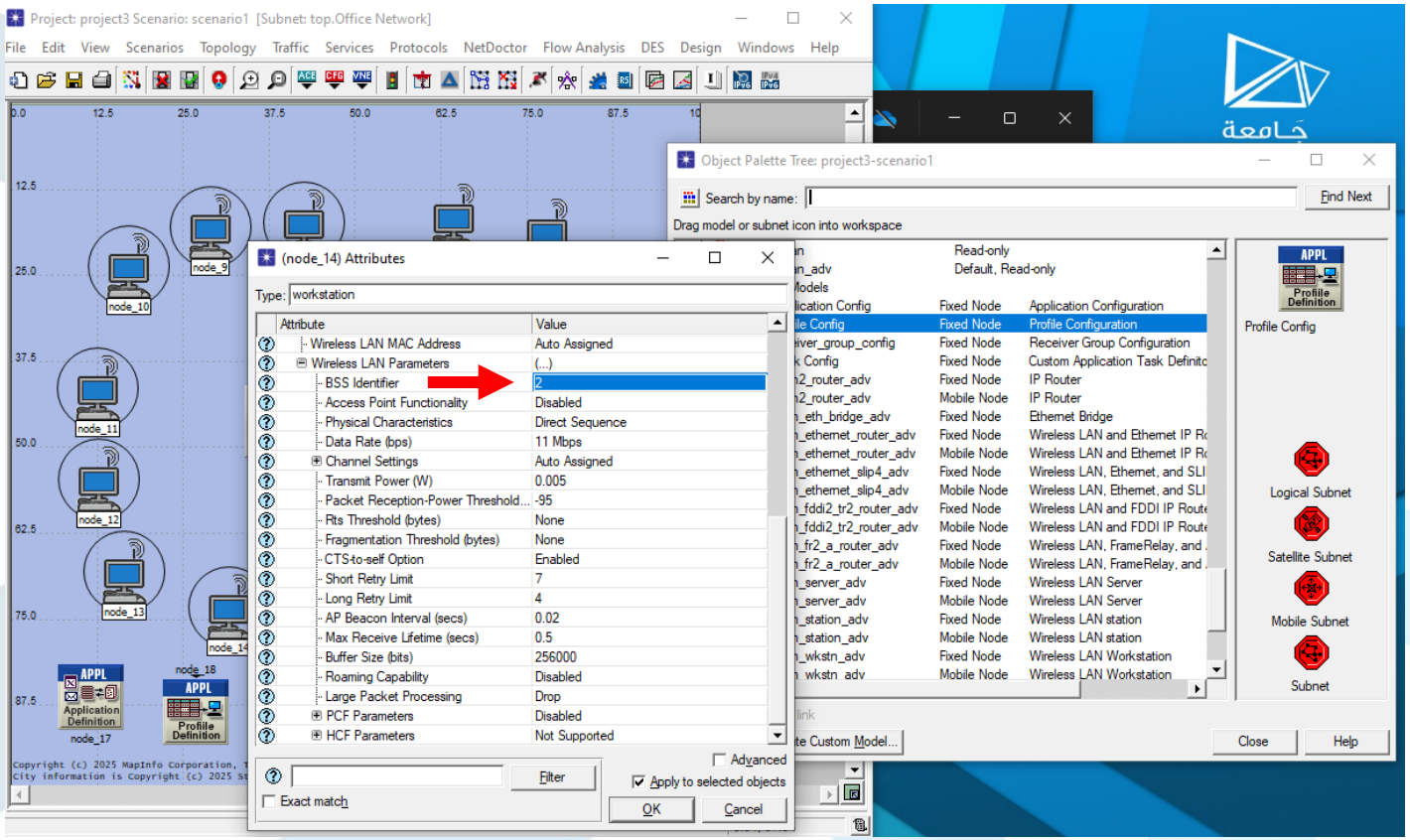
نقوم بإعطاء الطرفيات الموصولة على الراوتر قيمة BSS=1



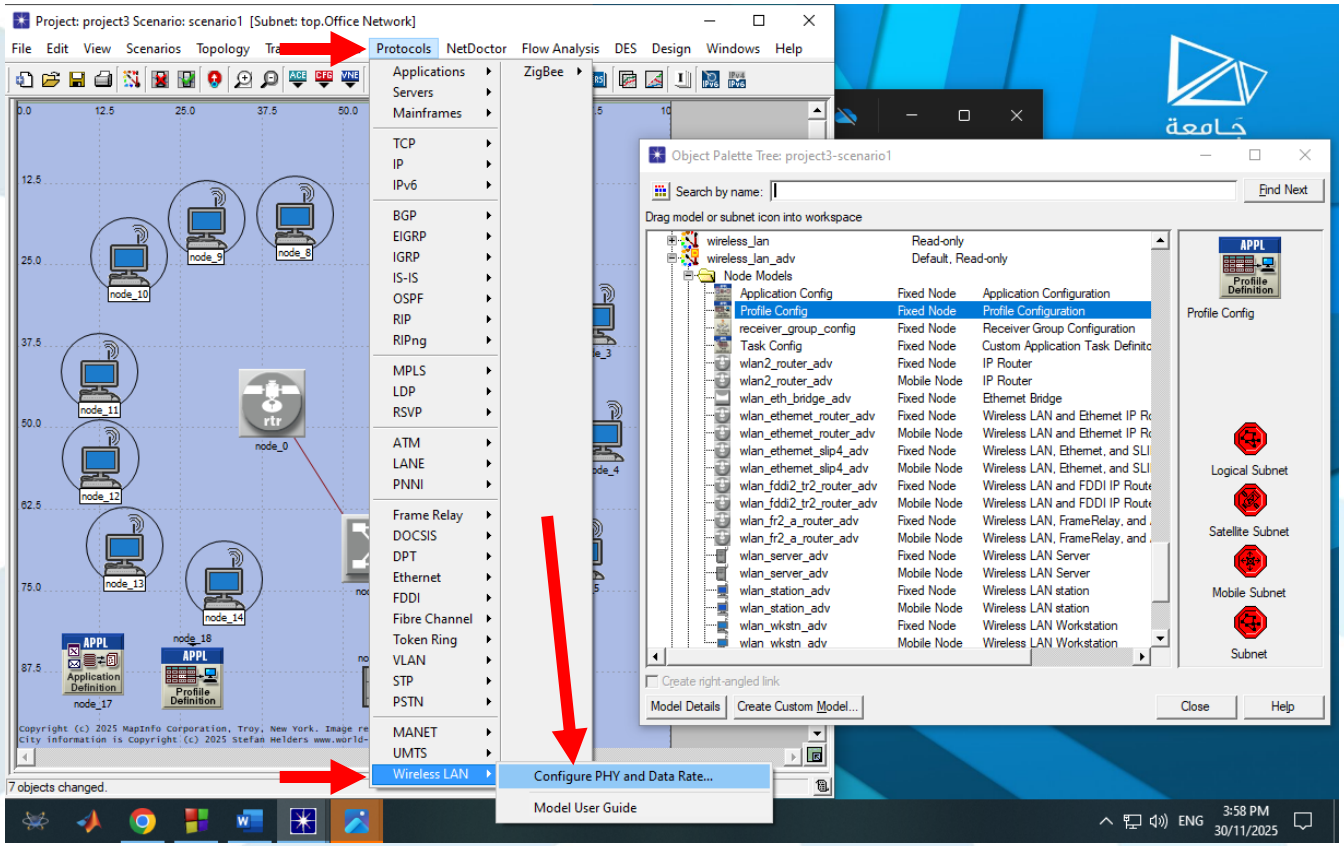
نقوم بإعطاء الطرفيات الموصولة على الراوتر1 قيمة BSS=1 مع اختيار كافة التطبيقات لاختصار عملية التطبيق ثم نحدد خيار apply to selected objects



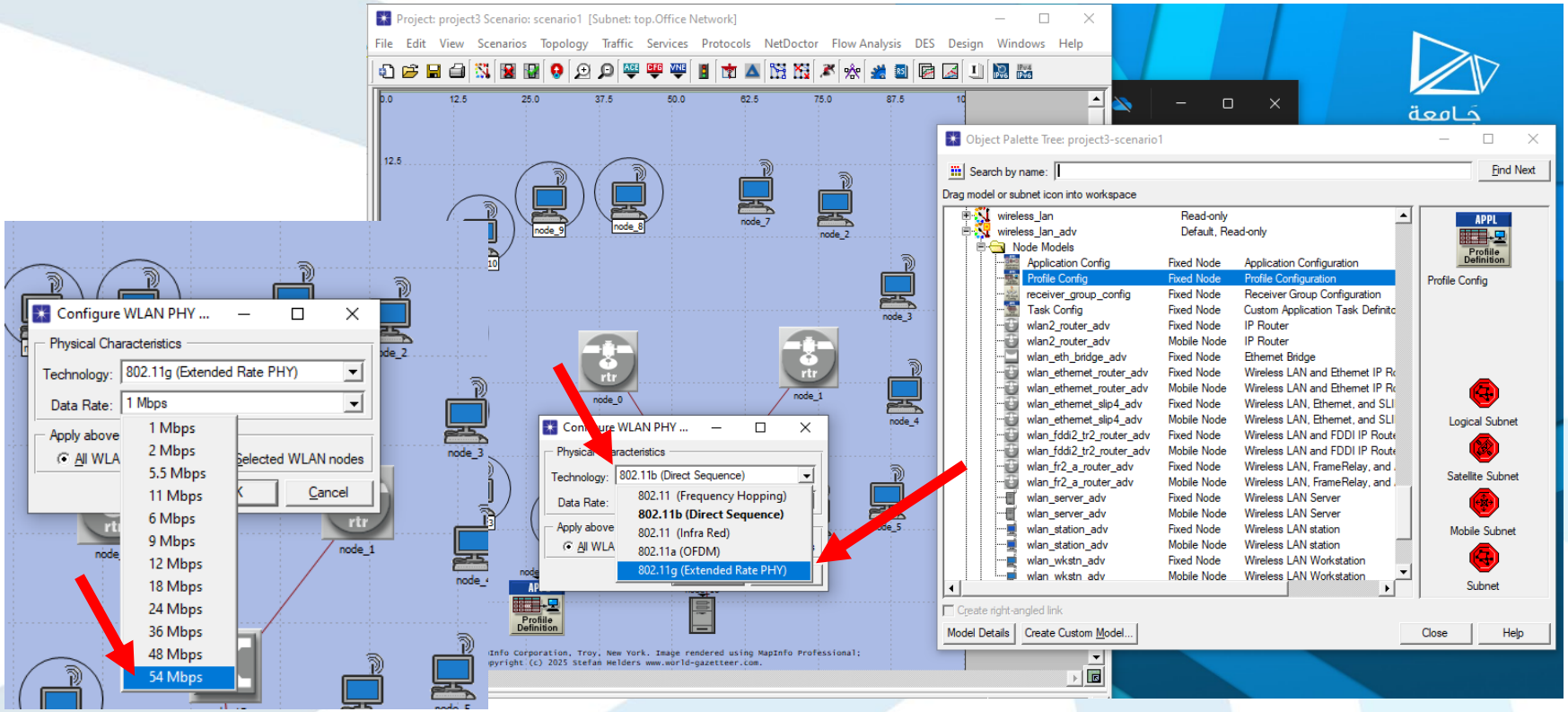
نقوم بإعطاء الطرفيات الموصولة على الراوتر 2 قيمة BSS=2 مع اختيار كافة التطبيقات لاختصار عملية التطبيق ثم نحدد خيار apply to selected objects



نقوم بإعطاء الطرفيات الموصولة على الراوتر 2 قيمة BSS=2 مع اختيار كافة التطبيقات لاختصار عملية التطبيق ثم نحدد خيار apply to selected objects



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

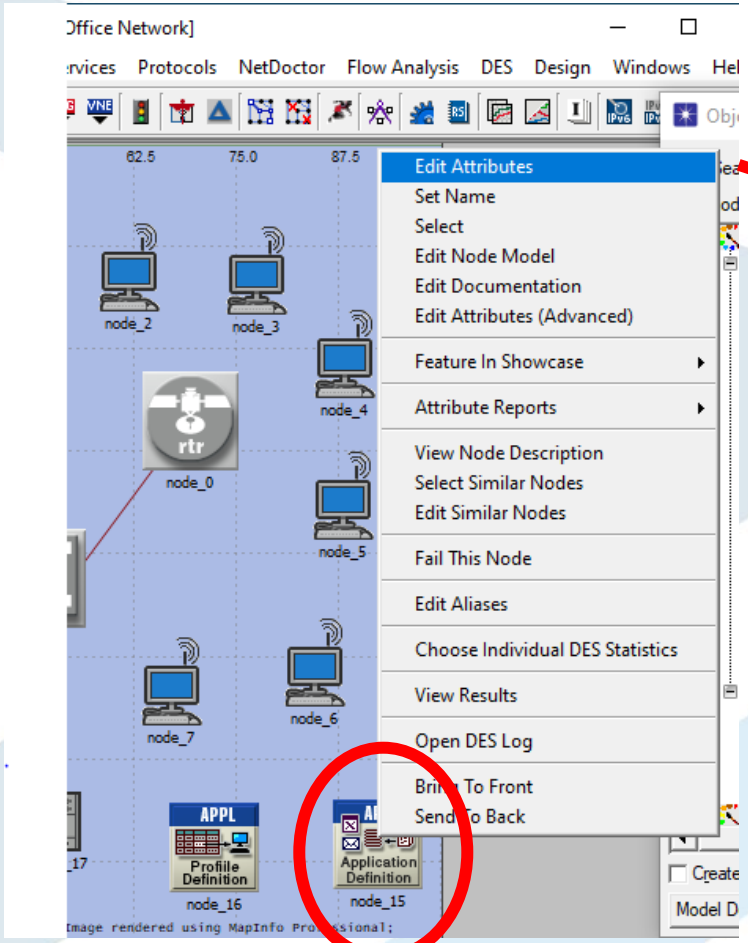


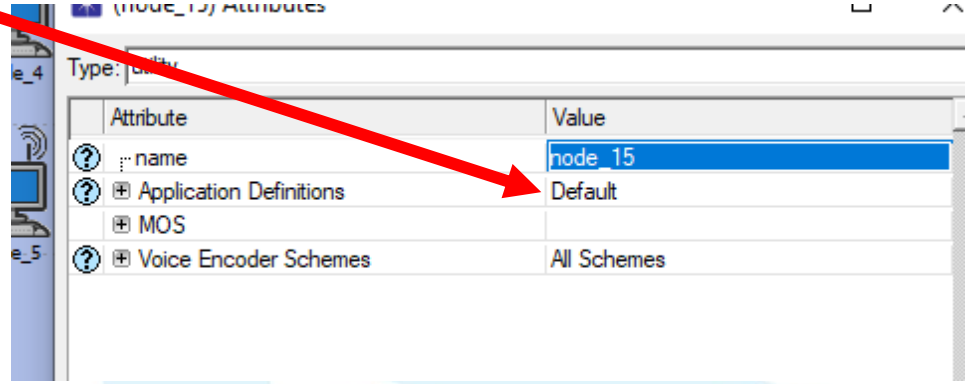
نختار wireless

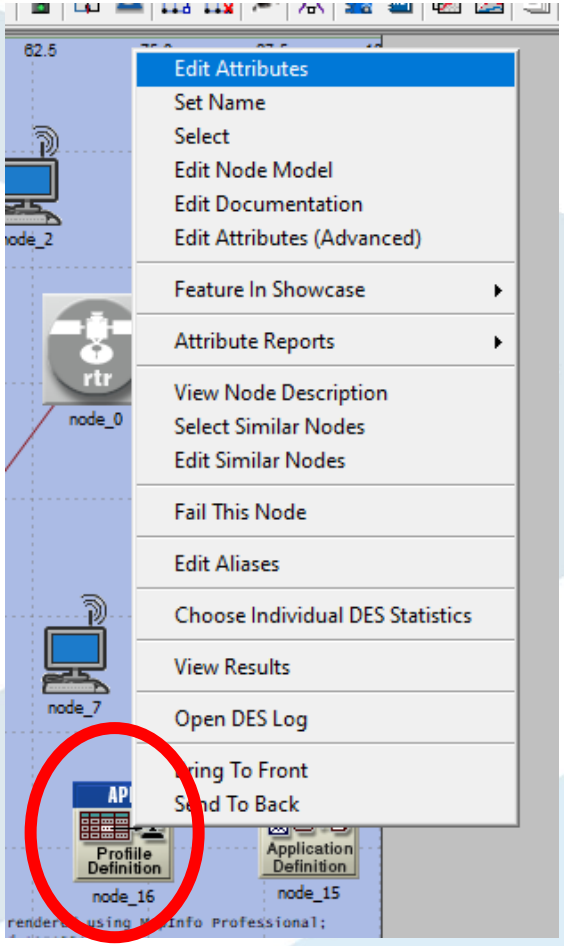
802.11g

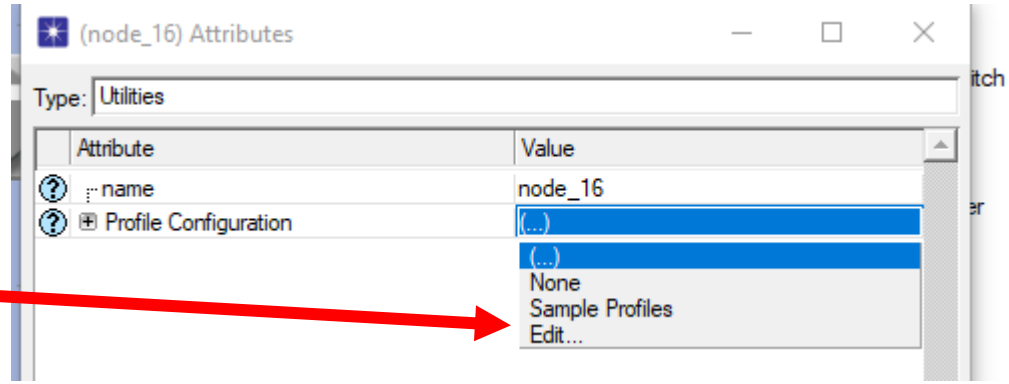
و سرعة 54

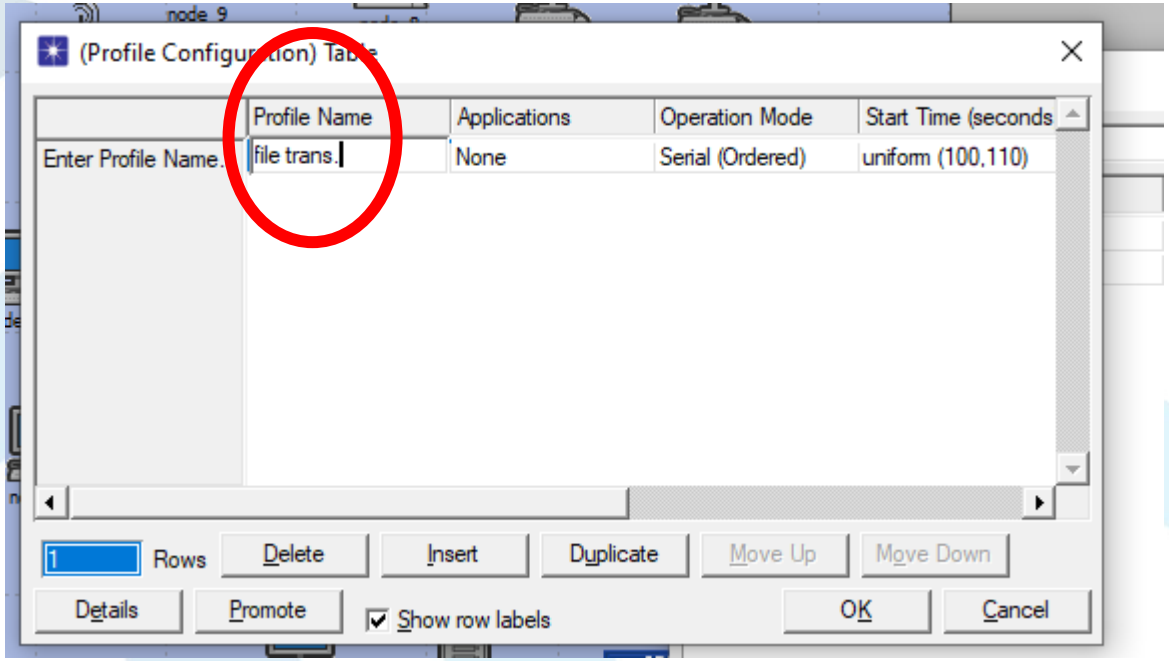
Mbps

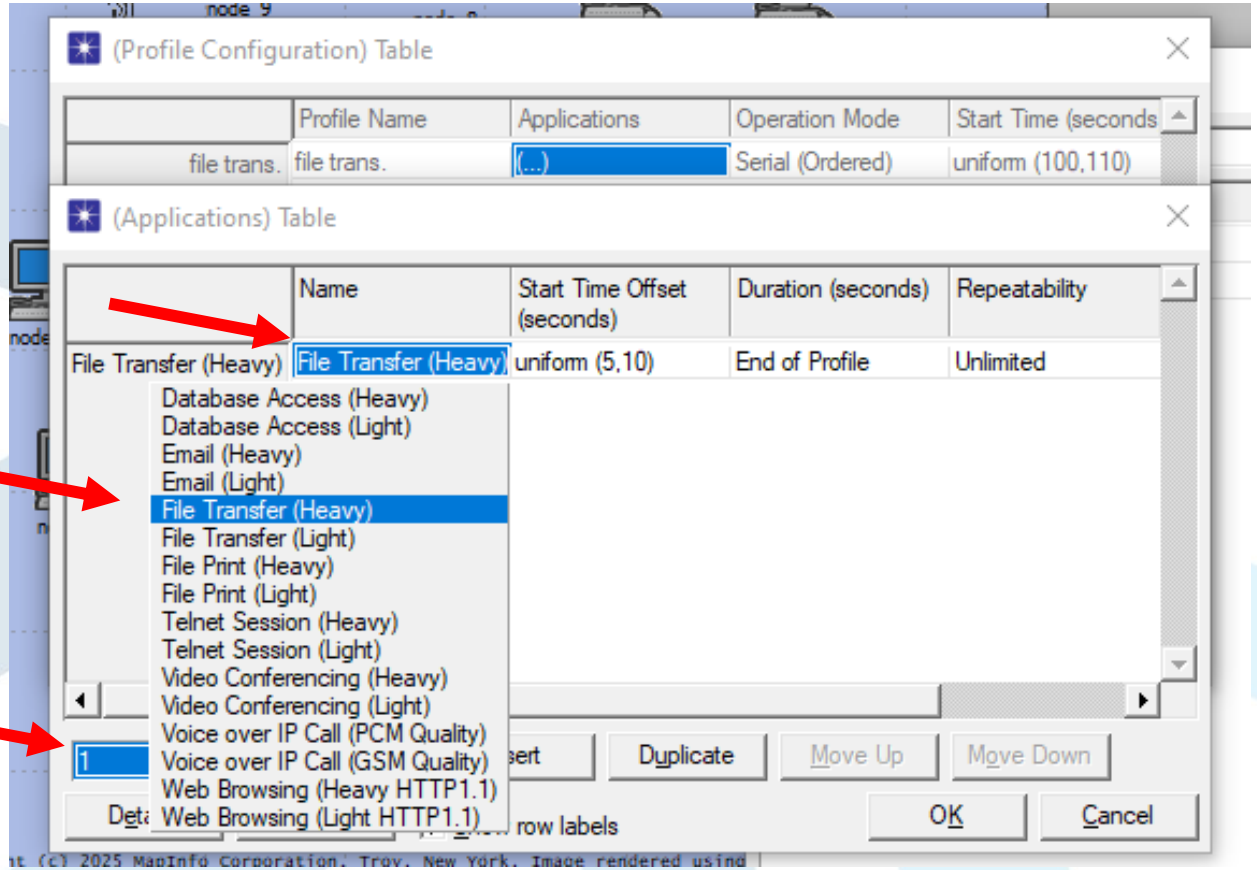

Office Network]
rvices Protocols NetDoctor Flow Analysis DES Design Windows Hel
62.5 75.0 87.5
node_2
node_3
node_4
rtr
node_0
node_5
node_7
node_6
APPL
Profile Definition
node_16
Application Definition
node_15
Edit Attributes
Set Name
Select
Edit Node Model
Edit Documentation
Edit Attributes (Advanced)
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
Open DES Log
Bri To Front
Send To Back
Create
Model D
Image rendered using MapInfo Pro ssional;

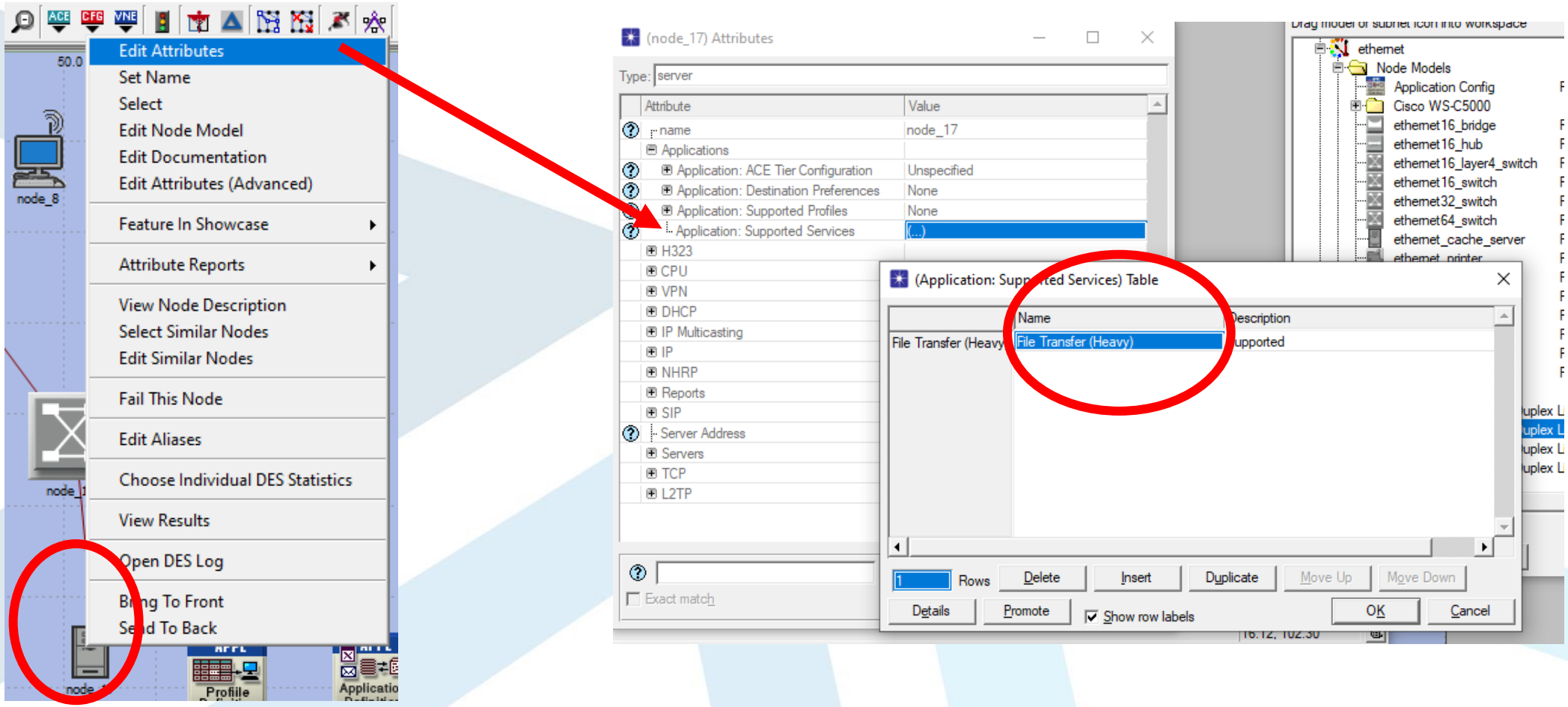

Type:
Attribute
Value
name
node_15
Application Definitions
Default
MOS
Voice Encoder Schemes
All Schemes


Edit Attributes
Set Name
Select
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
Open DES Log
Bring To Front
Send To Back
node_0
node_7
Profile Definition
node_16
Application Definition
node_15

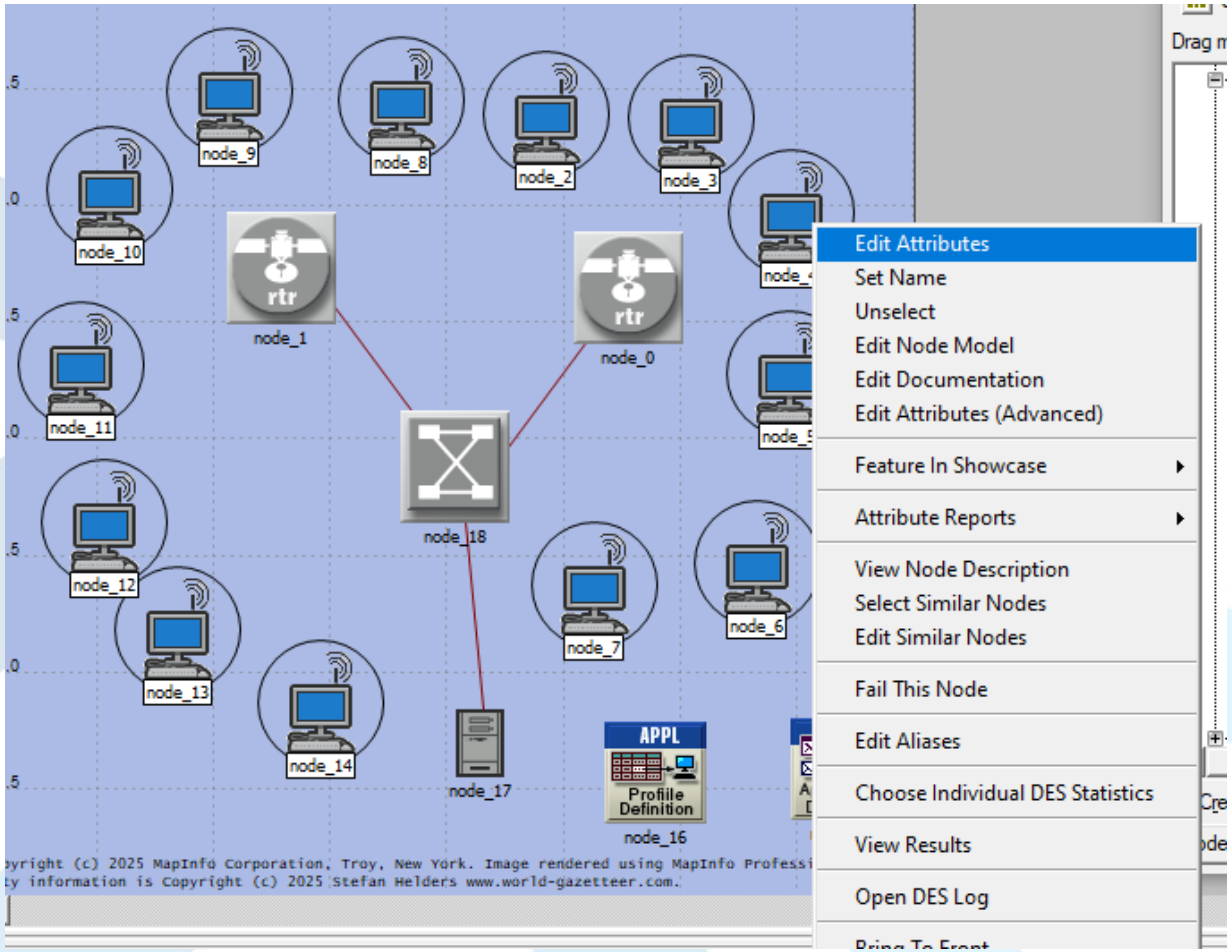

(node_16) Attributes
Type: Utilities
Attribute
Value
name
node_16
Profile Configuration
(...)
(...)
None
Sample Profiles
Edit...


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


(Profile Configuration) Table
Profile Name
Applications
Operation Mode
Start Time (seconds
file trans.
file trans.
(...)
Serial (Ordered)
uniform (100,110)
(Applications) Table
Name
Start Time Offset (seconds)
Duration (seconds)
Repeatability
File Transfer (Heavy)
File Transfer (Heavy)
uniform (5,10)
End of Profile
Unlimited
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
Duplicate
Move Up
Move Down
row labels
OK
Cancel


Edit Attributes
Set Name
Select
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
Open DES Log
Bring To Front
Send To Back
node_8
Profile
(node_17) Attributes
Type: server
Attribute
Value
name
node_17
Applications
Application: ACE Tier Configuration
Unspecified
Application: Destination Preferences
None
Application: Supported Profiles
None
Application: Supported Services
(...)
H323
CPU
VPN
DHCP
IP Multicasting
IP
NHRP
Reports
SIP
Server Address
Servers
TCP
L2TP
Exact match
(Application: Supported Services) Table
Name
Description
File Transfer (Heavy)
File Transfer (Heavy)
upported
1
Rows
Delete
Insert
Duplicate
Move Up
Move Down
Details
Promote
Show row labels
OK
Cancel
ethernet
Node Models
Application Config
Cisco WS-C5000
ethernet16_bridge
ethernet16_hub
ethernet16_layer4_switch
ethernet16_switch
ethernet32_switch
ethernet64_switch
ethernet_cache_server

نختار جميع الأجهزة الطرفية ونحدد تحرير الخصائص لتعريفها على البروفايل الجديد



نقوم بالتعديل على الـ

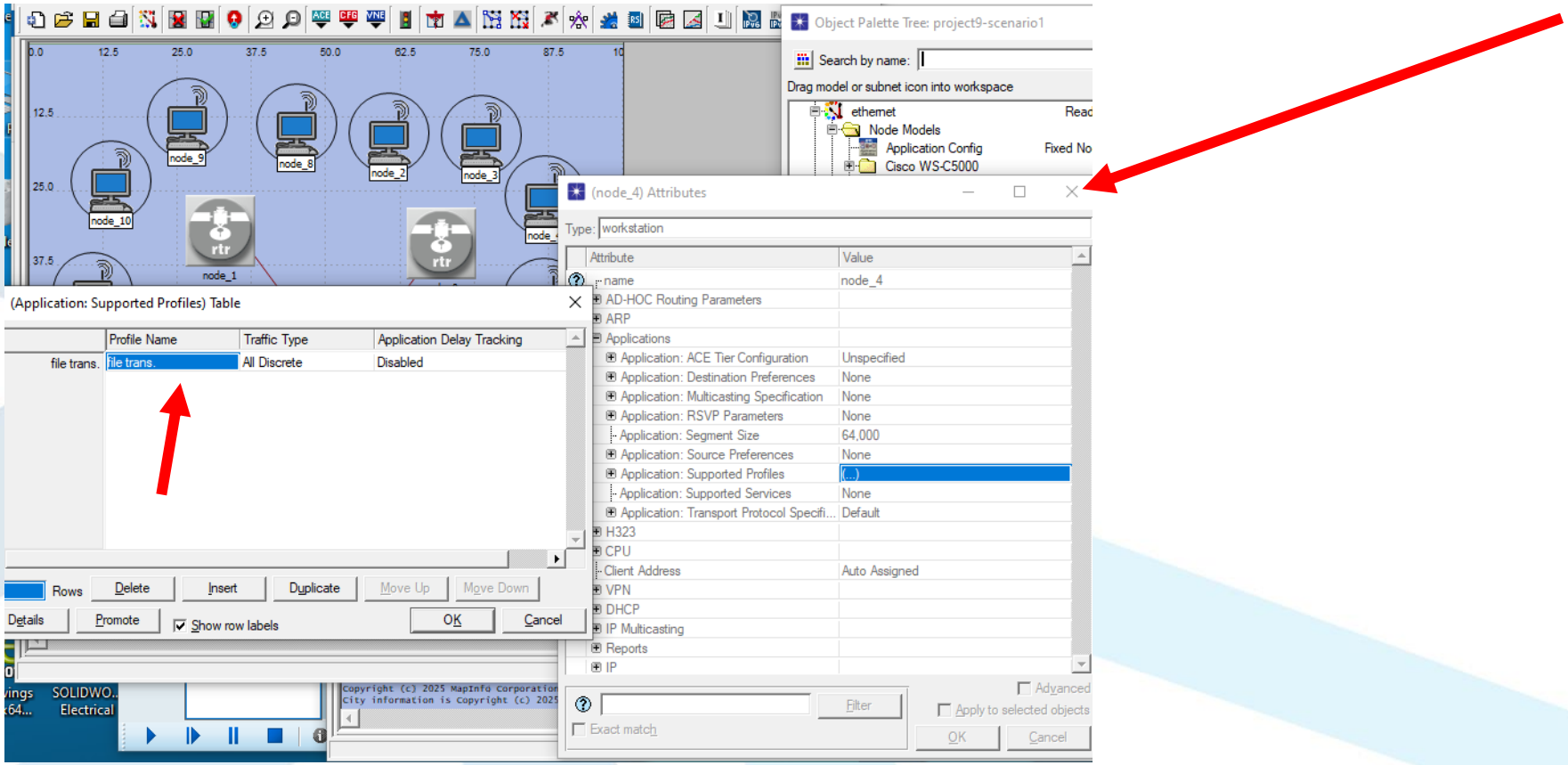
Supported

Profiles

بحيث نختار البروفايل

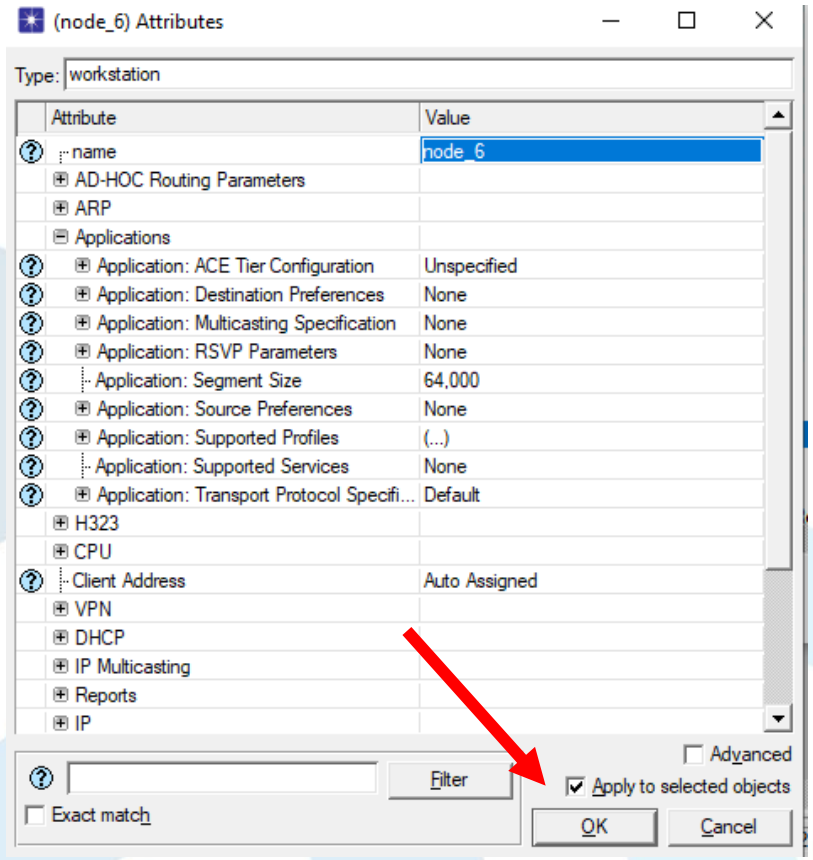
الذي قمنا بتعريفه

سابقا



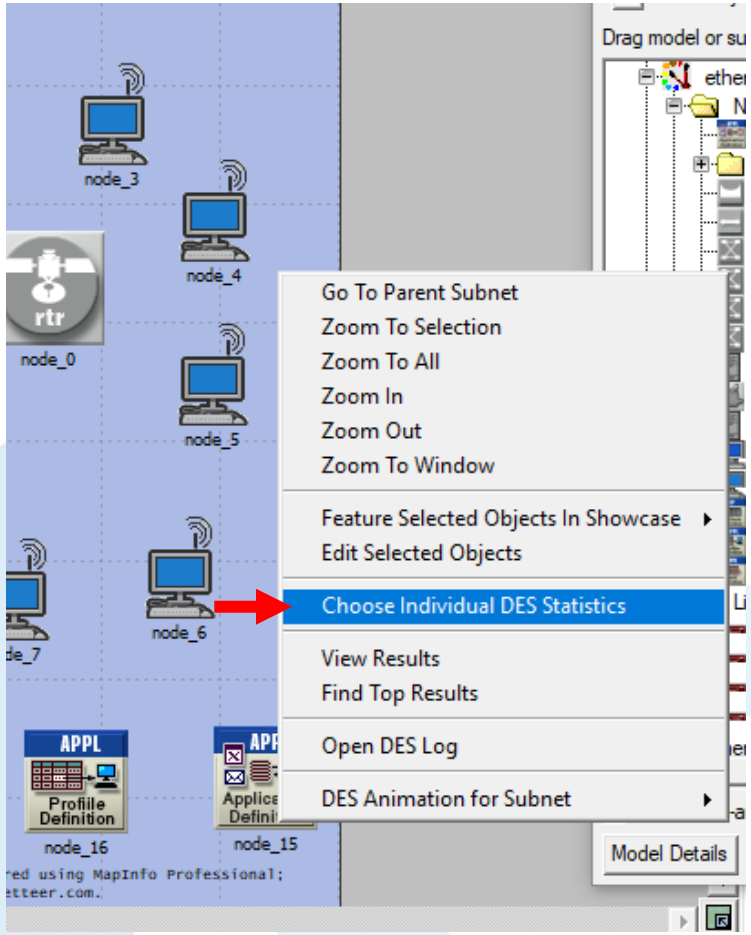
نطبقه على كافة

الطرفيات

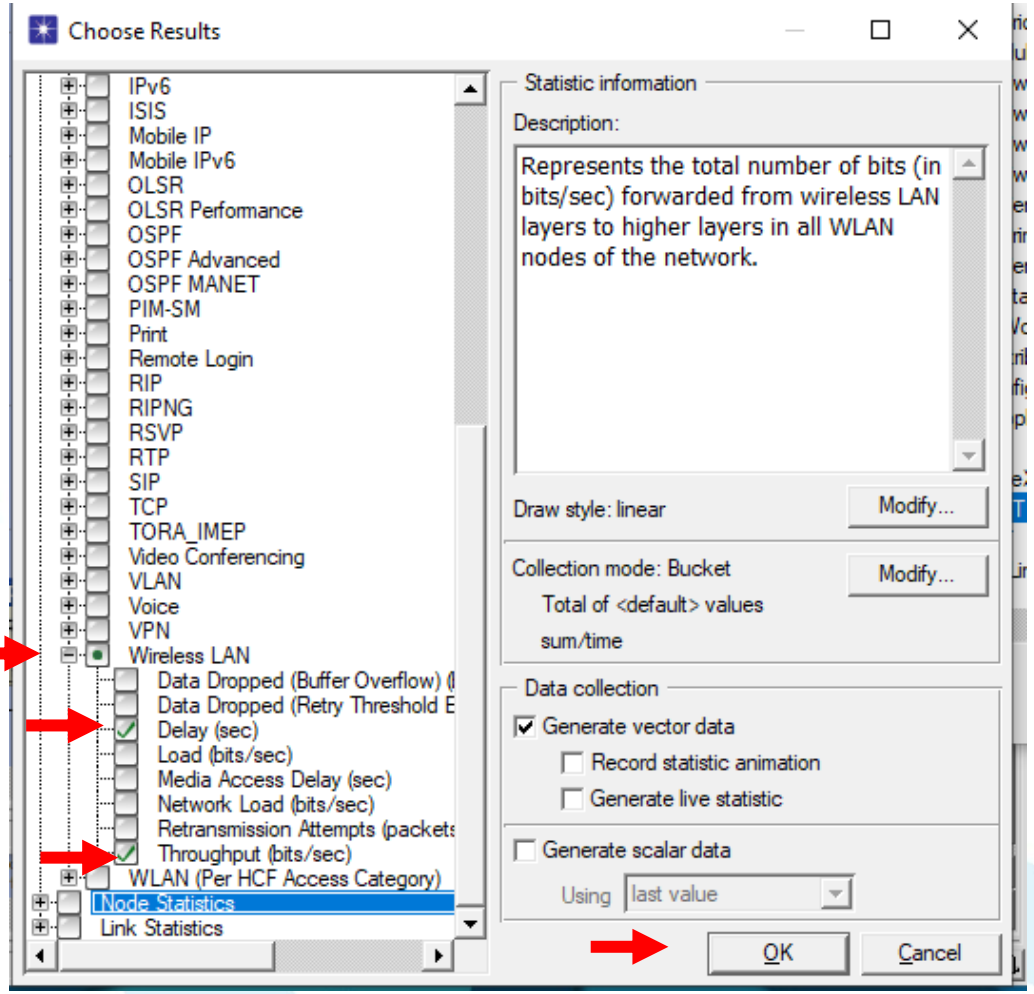


لتحليل أداء الشبكة ننقر بزر الفأرة اليميني على أي مكان ضمن سطح العمل الأزرق ونختار

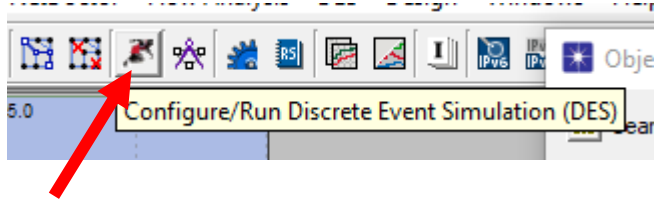
Choose individual DES Statistics

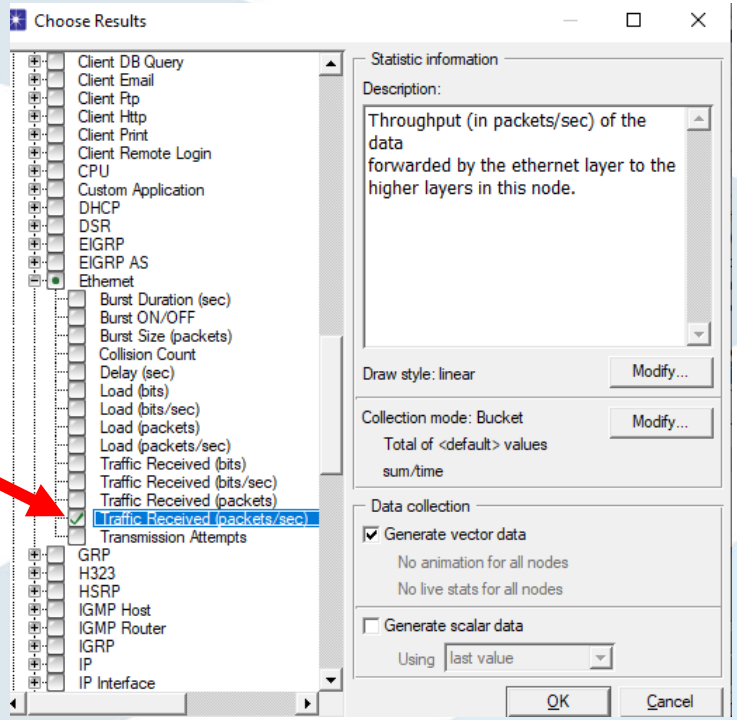


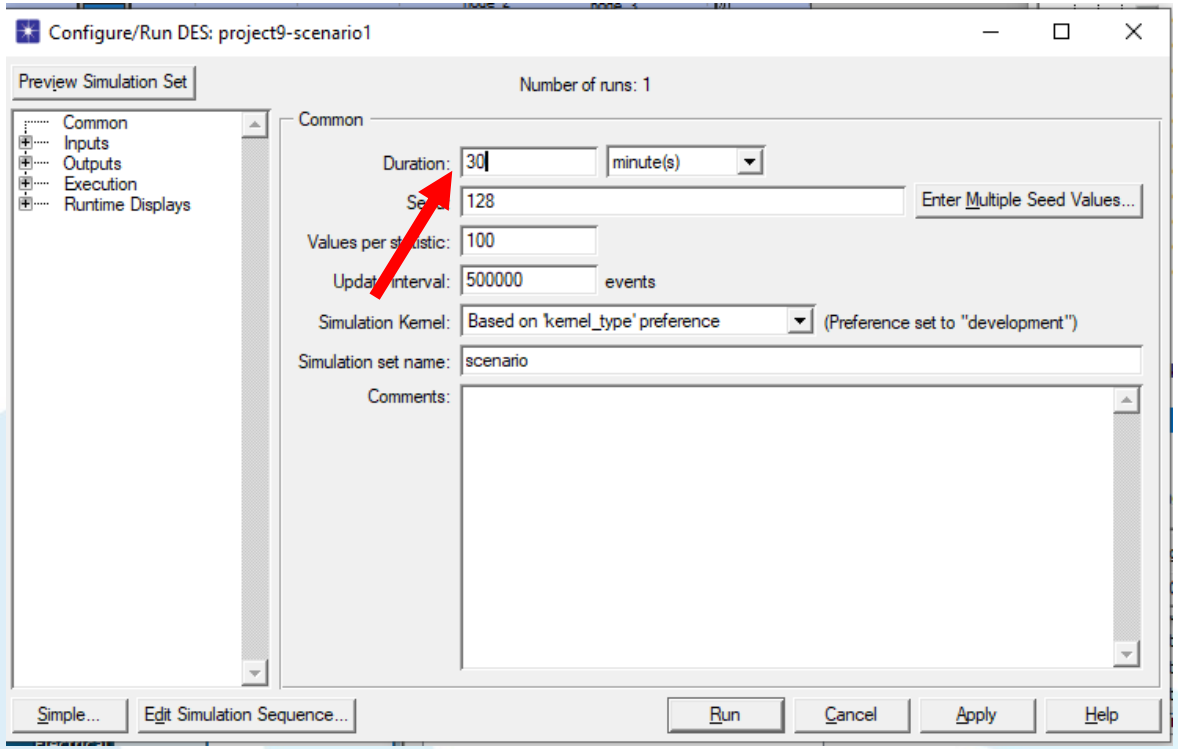
نتأكد من تطبيق
كافة التعديلات على
كل أجهزة الشبكة

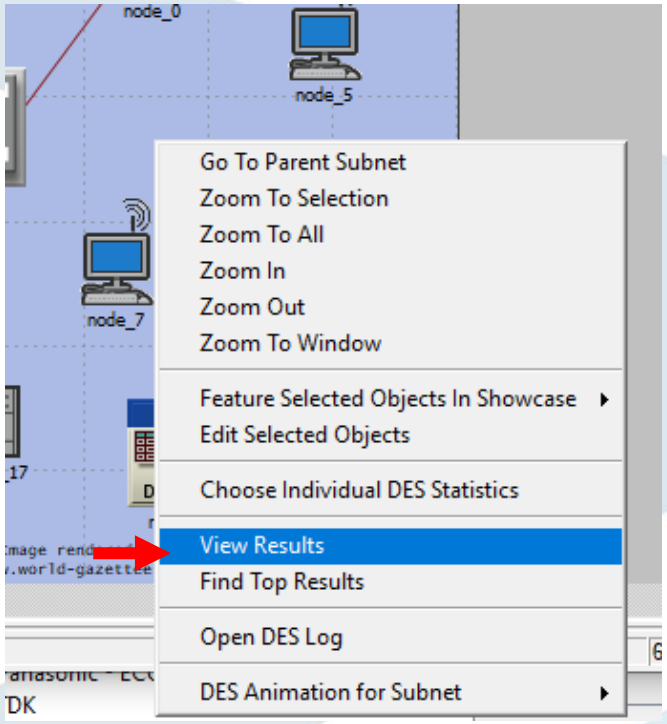


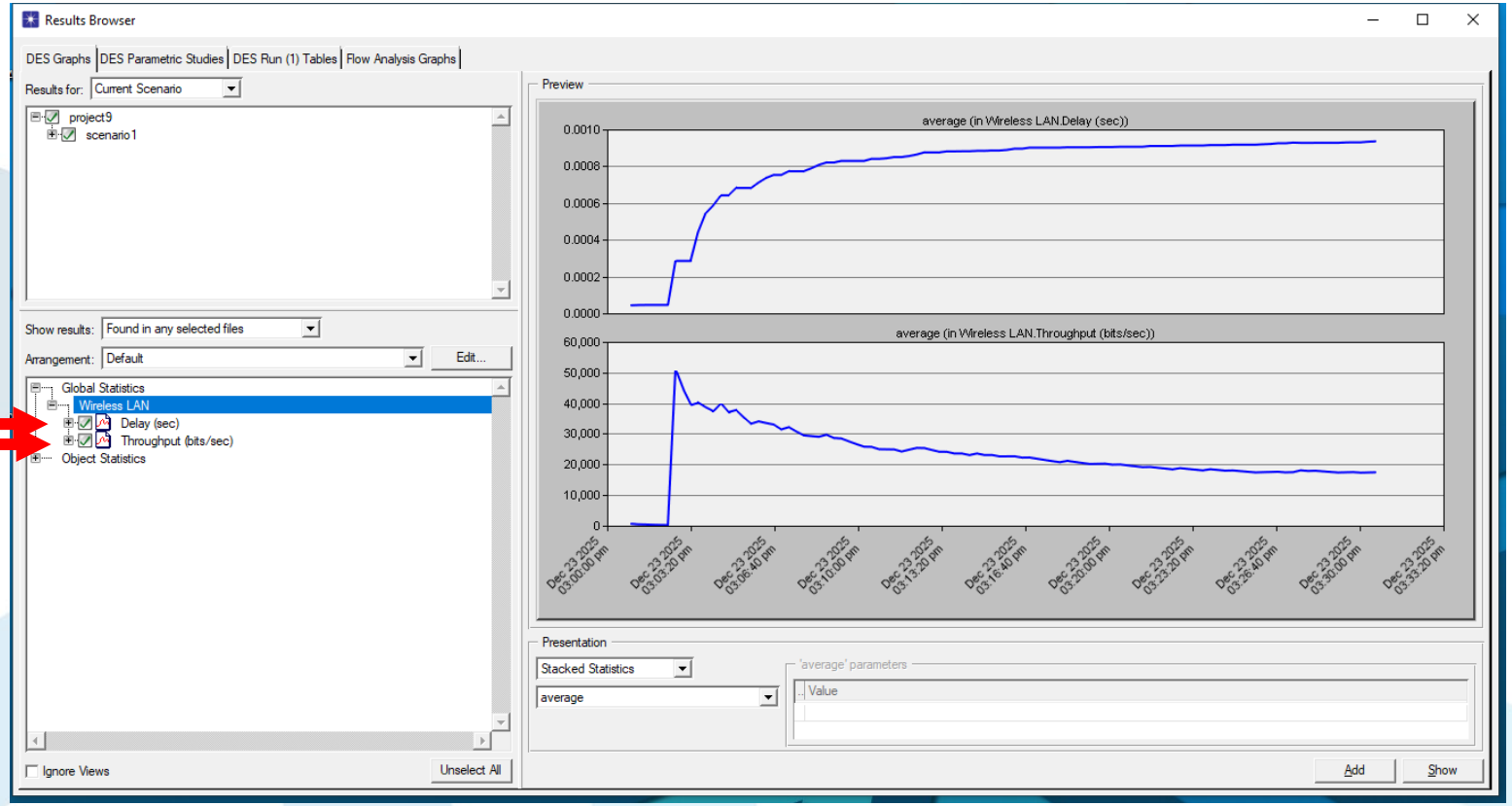
خيارات إضافية للتحليل

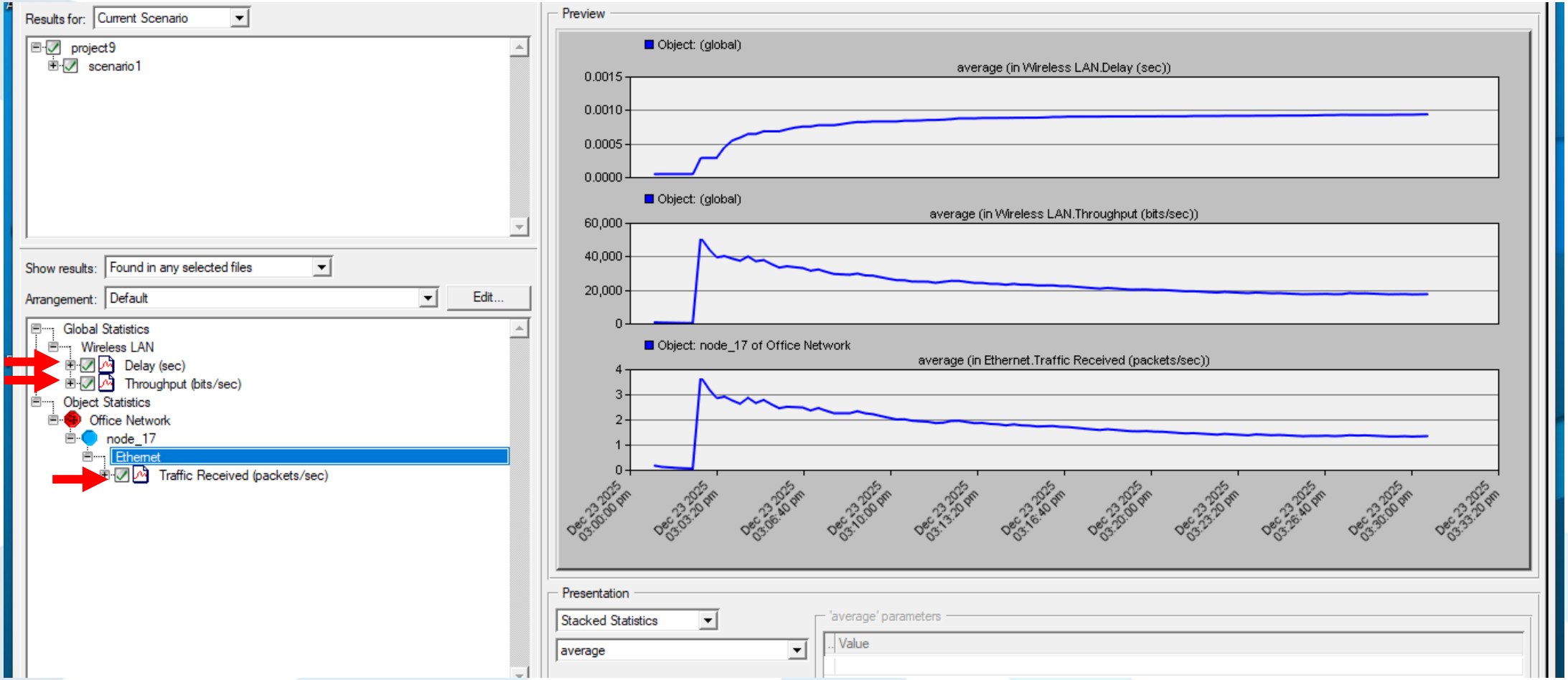


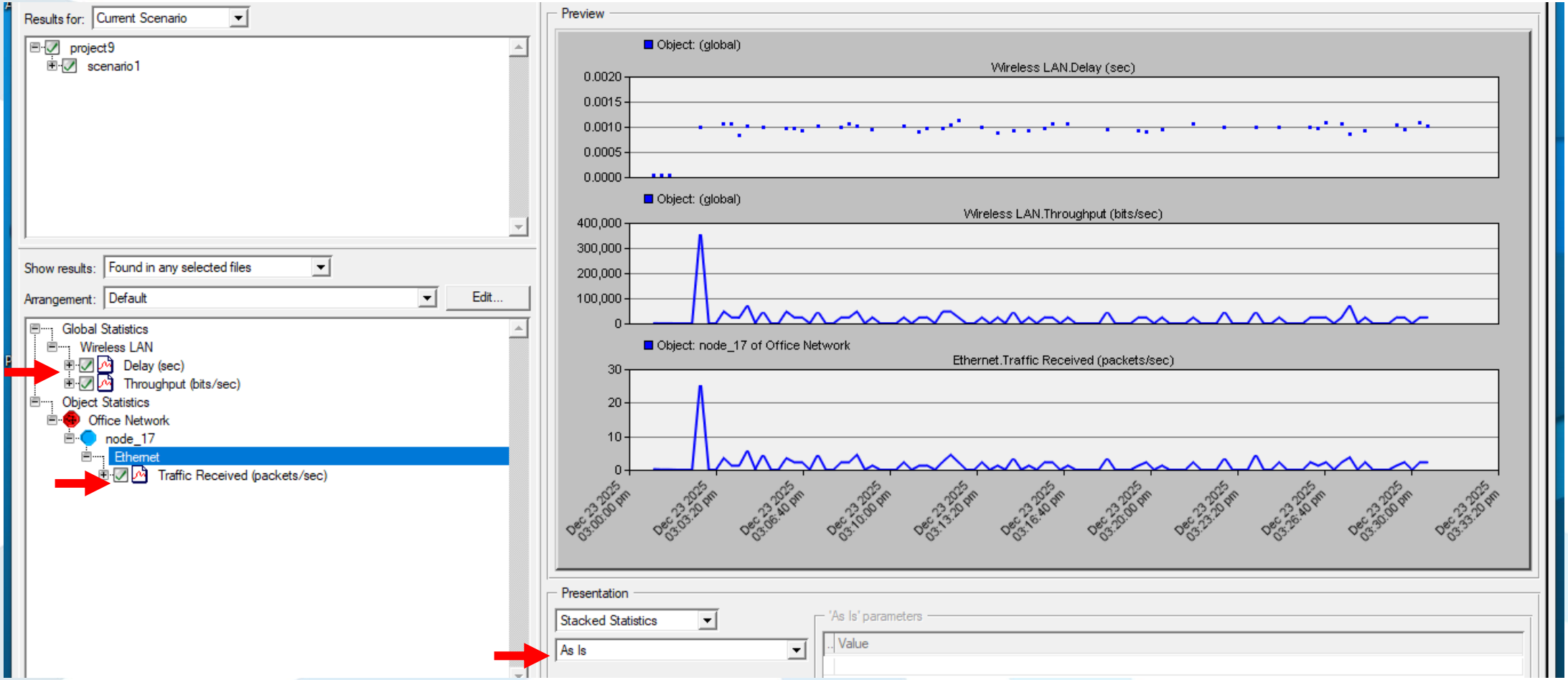





node_0
node_5
node_7
Go To Parent Subnet
Zoom To Selection
Zoom To All
Zoom In
Zoom Out
Zoom To Window
Feature Selected Objects In Showcase
Edit Selected Objects
Choose Individual DES Statistics
View Results
Find Top Results
Open DES Log
DES Animation for Subnet


Results Browser
DES Graphs
DES Parametric Studies
DES Run (1) Tables
Flow Analysis Graphs
Results for:
Current Scenario
project9
scenario1
Show results:
Found in any selected files
Arrangement:
Default
Edit...
Global Statistics
Wireless LAN
Delay (sec)
Throughput (bits/sec)
Object Statistics
Ignore Views
Unselect All
Preview
average (in Wireless LAN.Delay (sec))
average (in Wireless LAN.Throughput (bits/sec))
Presentation
Stacked Statistics
average
'average' parameters
Value
Add
Show


Results for: Current Scenario
project9
scenario1
Show results: Found in any selected files
Arrangement: Default
Edit...
Global Statistics
Wireless LAN
Delay (sec)
Throughput (bits/sec)
Object Statistics
Office Network
node_17
Ethernet
Traffic Received (packets/sec)
Preview
Object: (global)
average (in Wireless LAN.Delay (sec))
0.0015
0.0010
0.0005
0.0000
Object: (global)
average (in Wireless LAN.Throughput (bits/sec))
60,000
40,000
20,000
0
Object: node_17 of Office Network
average (in Ethernet.Traffic Received (packets/sec))
4
3
2
1
0
Dec 23 2025 03:00:00 pm
Dec 23 2025 03:03:20 pm
Dec 23 2025 03:06:40 pm
Dec 23 2025 03:10:00 pm
Dec 23 2025 03:13:20 pm
Dec 23 2025 03:16:40 pm
Dec 23 2025 03:20:00 pm
Dec 23 2025 03:23:20 pm
Dec 23 2025 03:26:40 pm
Dec 23 2025 03:30:00 pm
Dec 23 2025 03:33:20 pm
Presentation
Stacked Statistics
average
'average' parameters
Value


Results for: Current Scenario
project9
scenario1
Show results: Found in any selected files
Arrangement: Default
Edit...
Global Statistics
Wireless LAN
Delay (sec)
Throughput (bits/sec)
Object Statistics
Office Network
node_17
Ethernet
Traffic Received (packets/sec)
Preview
Object: (global)
Wireless LAN.Delay (sec)
0.0020
0.0015
0.0010
0.0005
0.0000
Object: (global)
Wireless LAN.Throughput (bits/sec)
400,000
300,000
200,000
100,000
0
Object: node_17 of Office Network
Ethernet.Traffic Received (packets/sec)
30
20
10
0
Dec 23 2025 03:00:00 pm
Dec 23 2025 03:03:20 pm
Dec 23 2025 03:06:40 pm
Dec 23 2025 03:10:00 pm
Dec 23 2025 03:13:20 pm
Dec 23 2025 03:16:40 pm
Dec 23 2025 03:20:00 pm
Dec 23 2025 03:23:20 pm
Dec 23 2025 03:26:40 pm
Dec 23 2025 03:30:00 pm
Dec 23 2025 03:33:20 pm
Presentation
Stacked Statistics
As Is
'As Is' parameters
Value

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Thanks for Listening