

# General Help of Network Traffic Generation and Analysis Platform

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## 1. Main Structure of the NTGA Platform Software

This network traffic generation and analysis (NTGA) platform has been constructed as shown in the following diagram and table.

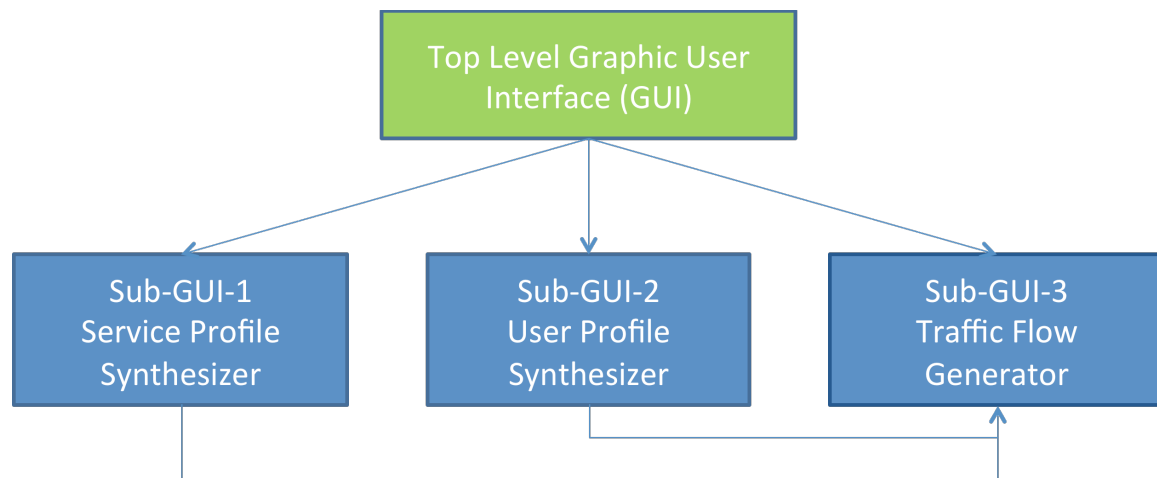


Fig.1 Bone structure of the NTGA Platform Software at the system level.

Table I Main function of each module

Module name	Main functions
Top Level GUI	Main UI; Launch individual sub GUIs and some documents;
Service Profile Synthesizer	Load default service profile; Modify a current service profile; Save and update service profile; Two approaches simple validation;
User Profile Synthesizer	Configure each types of service; Generate statistical customisable user profiles with aggregated configuration of services; View one trial of the statistical user profile; Save and update user profile;
Traffic Flow Generator	Import user editable Metro core node configuration; Statistically generate metro code node configuration; Load service profile, user profile and percentage of each user profile; Statistically generate traffic flow matrix; Measure and evaluate the generated traffic flows; Export traffic flows matrix;

## 2. Top Level Graphic User Interface

Top GUI provides a high-level control of the software tool as shown below, which contains three buttons that link to three essential sub-GUI software tools, i.e., Service Profile Synthesizer, User Profile Synthesizer and Traffic Flow Generator.

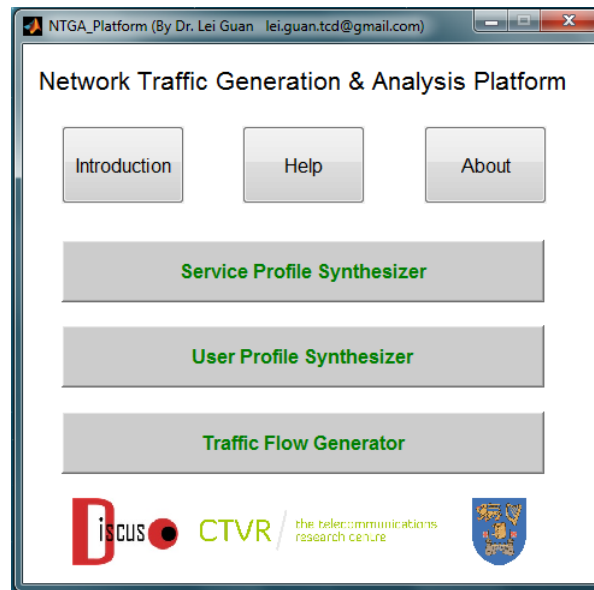


Fig. 2 The main UI of the NTGA platform.

### 3. Service Profile Synthesizer

#### 3.1 Introduction

This sub-GUI is designed for characterizing different services that occurred in a given network. The main parameters of each service are: downstream bandwidth requirement, upstream bandwidth requirement, Peer-to-peer traffic percentage, Data centre traffic percentage and Internet Exchange traffic percentage.

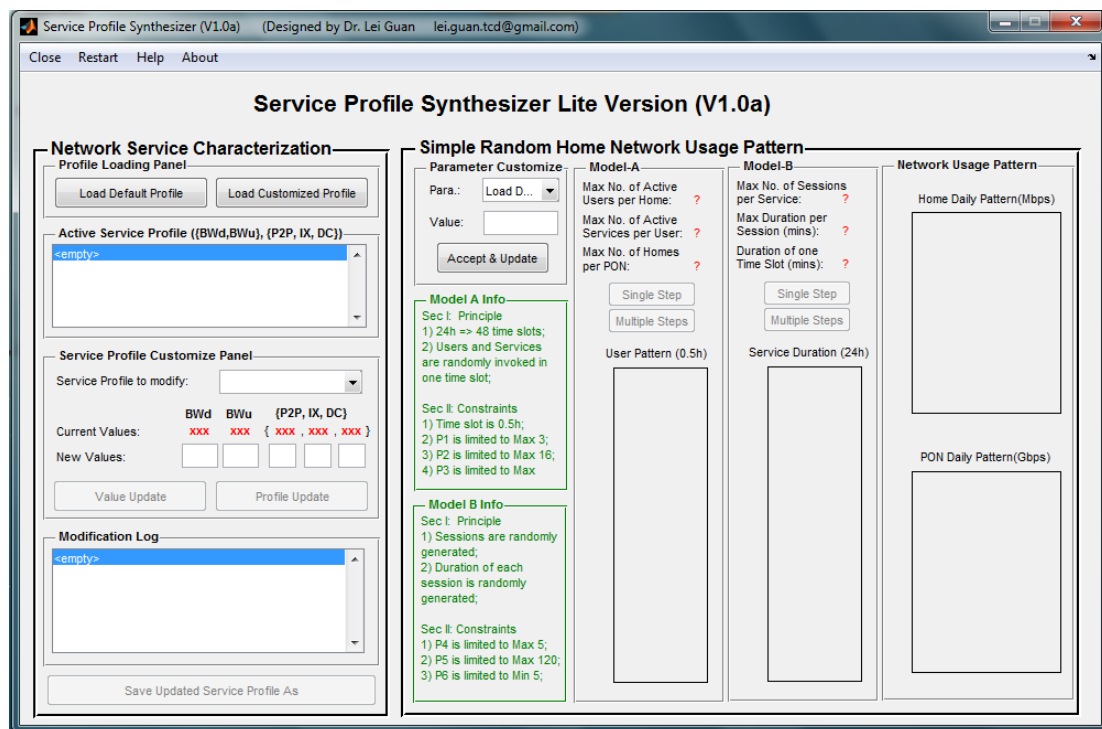


Fig.3 UI of Service Profile Synthesizer.

A default service profile has been pre-defined as below.

Table II. Default Service profile

No.	Name	BWDS	BWUS	P2P	IX	DC
S1-1	E-Life	1	0.5	0.3	0.4	0.3
S1-2	E-Entertainment	1	0.5	0.3	0.4	0.3
S1-3	E-Commerce	0.5	0.25	0.3	0.4	0.3
S1-4	E-Learning	0.5	0.25	0.3	0.4	0.3
S1-5	E-Social	5	2.5	0.3	0.4	0.3
S2-1	VoD-UHD(2160P)	25	2.5	0.3	0.1	0.6
S2-2	VoD-FHD(1080P)	18	1.8	0.2	0.1	0.7
S2-3	VoD-HD(720P)	8	0.8	0.2	0.1	0.7
S2-4	VoD-SD(480P)	2	0.2	0.2	0.1	0.7
S2-5	VC-HD(720P)	16	16	0.2	0.3	0.5
S2-6	VC-SD(480P)	3	3	0.2	0.3	0.5
S2-7	VC-LD(240P)	0.7	0.7	0.2	0.3	0.5
S2-8	Online-Gaming	6	3	0.3	0.4	0.3
S2-9	VoIP	0.2	0.2	0.3	0.4	0.3
S3-1	File-Sharing	10	10	0.8	0.05	0.15
S3-2	Data-Backup	5	5	0.2	0.1	0.7

Except for the name of the service, other parameters of a given service can be customized according to the user's measurement or prediction.

Besides the service profile modification capability, this sub-module also provides two simple validation models for evaluating the parameters.

## 3.2 Working Flow

### Load and modify service profile

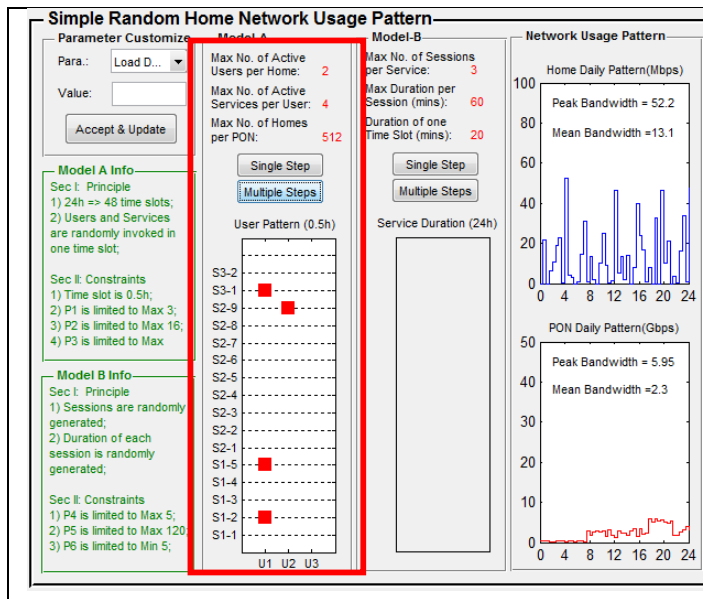
The figure displays three sequential screenshots of the 'Network Service Characterization' software interface, illustrating the workflow for loading and modifying service profiles.

**Load default profile:** The first screenshot shows the 'Profile Loading Panel' with the 'Load Default Profile' button highlighted. The 'Active Service Profile' list shows S1-1: E-Life as the active profile. The 'Service Profile Customize Panel' shows the 'Service Profile to modify' dropdown set to 'S1-1: E-Life'. The 'Current Values' are displayed as BWd: xxx, BWu: xxx, {P2P, IX, DC}: { xxx , xxx , xxx }. The 'New Values' fields are empty.

**Modify a selected profile:** The second screenshot shows the 'Service Profile to modify' dropdown set to 'S1-2: E-Entertainment'. The 'Current Values' are displayed as BWd: 1, BWu: 0.5, {P2P, IX, DC}: { 0.3 , 0.4 , 0.3 }. The 'New Values' fields are highlighted with a red box, showing BWd: 5, BWu: 2, {P2P, IX, DC}: { 0.1 , 0.1 , 0.8 }.

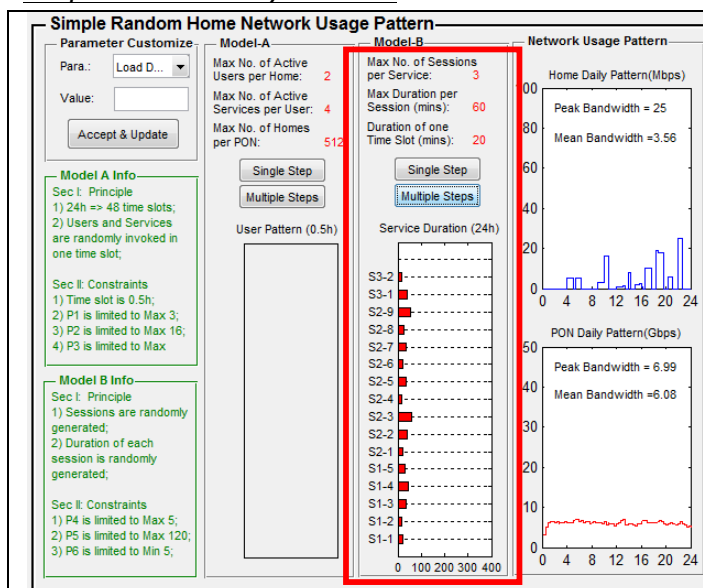
**Update the modified profile:** The third screenshot shows the 'Service Profile to modify' dropdown set to 'S1-2: E-Entertainment'. The 'Current Values' are displayed as BWd: 1, BWu: 0.5, {P2P, IX, DC}: { 0.3 , 0.4 , 0.3 }. The 'New Values' fields are highlighted with a red box, showing BWd: 5, BWu: 2, {P2P, IX, DC}: { 0.1 , 0.1 , 0.8 }. The 'Modification Log' at the bottom shows the updated profile: 'S1-2: E-Entertainment => { 5, 2, { 0.1, 0.1, 0.8 } }'.

### Simple validation by model A



- Random invoke services from service list;
- Minimum unit is 0.5h;
- Single step generates pattern for 0.5 h (one time slot);
- Multiple steps generate pattern for 24h (48 time slots);
- Home Daily Pattern will statistically aggregated services usage;
- A scaling parameter was used for showing PON pattern regarding various user behavior during different period of time;

### Simple validation by model B



- Sessions are randomly generated for each service across 24 hours;
- Duration of each session is randomly generated;
- Service sessions durations are provided;
- Home daily usage will aggregate all of the services in the list;
- Normal distribution is used for PON level aggregation;

## 4. User Profile Synthesizer

### 4.1 Introduction

This sub-GUI is designed for generating user profile that statistically characterizes the network usage behavior of a group of users.

In the current version (V1.0a), four parameters are used for reflecting the usage of a given service. Each of the parameter has been modelled by a beta function with typical inputs  $a$ ,  $b$ ,  $var$  or scaling factor. Several typical beta distributions have been pre-set as options in each of the popup menu. User customization function is also available in this version.

**User Profile Synthesizer Lite Version (V1.0a)**

**Internet Surfing Services (ISS)**

ISS-User Number	Service Type	Status	ISS-Start of Session	ISS-Duration	ISS-Session Probability	ISS-Gap Probability
S1-1	<input type="radio"/> E-Life	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S1-2	<input type="radio"/> E-Entertainment	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S1-3	<input type="radio"/> E-Commerce	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S1-4	<input type="radio"/> E-Learning	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S1-5	<input type="radio"/> E-Social	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply

**Multi Media Services (MMS)**

MMS-User Number	Service Type	Status	MMS-Start of Session	MMS-Duration	MMS-Session Probability	MMS-Gap Probability
S2-1	<input type="radio"/> VoD UHD 2160P	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-2	<input type="radio"/> VoD FHD 1080P	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-3	<input type="radio"/> VoD HD 720P	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-4	<input type="radio"/> VoD SD 480P	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-5	<input type="radio"/> VC HD 720P	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-6	<input type="radio"/> VC SD 480P	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-7	<input type="radio"/> VC LD 240P	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-8	<input type="radio"/> Online Gaming	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S2-9	<input type="radio"/> VoIP	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply

**Pure Data Services (PDS)**

PDS-User Number	Service Type	Status	PDS-Start of Session	PDS-Duration	PDS-Session Probability	PDS-Gap Probability
S3-1	<input type="radio"/> File Sharing	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply
S3-2	<input type="radio"/> Data Backup	OFF	Mode: Select a ... a=? b=? Var=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=?	Mode: Select a ... a=? b=? Max=? Apply

Fig. 4 UI of User Profile Synthesizer.

One meaningful user profile may contain one validated service or multiple services that characterized by beta functions respectively. One typical user profile actually aggregates all of the usage of selected services for one day statistically. For a particular day, it may look like as the figure shown below. The corresponding distribution, total duration, usage break down, duration break down will be also measured and shown in a new popup GUI.

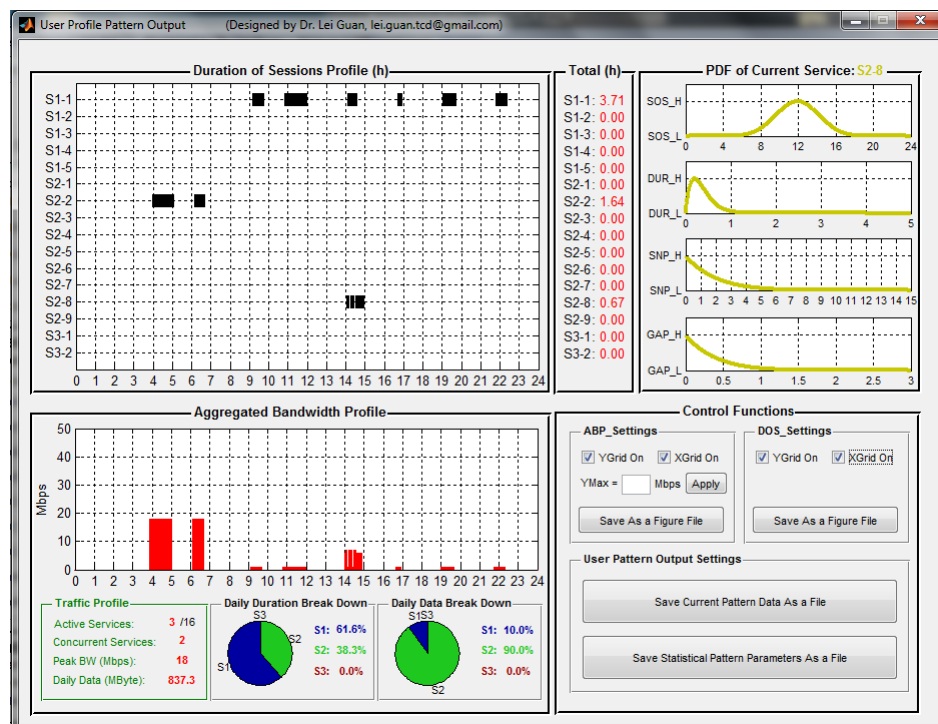


Fig. 5 Snap shot of an example of User Profile Output illustration.

## 4.2 Working Flow

### Enable Service

After enabling a service, the corresponding status will be switched to “ON” automatically.

Internet Surfing Services (ISS)						
ISS-User Number	Service Type	Status	ISS-Start of Session	ISS-Duration	ISS-Session Probability	ISS-Gap Probability
S1-1	E-Life	ON	Mode: STType 1, a=3, b=14, Var=0.05	Mode: DType 1, a=2, b=25, Max=5	Mode: NType 1, a=1, b=1, Max=15	Mode: GType 1, a=1, b=1, Max=3
S1-2	E-Entertainment	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S1-3	E-Commerce	ON	Mode: STType 2, a=14, b=14, Var=0.05	Mode: DType 1, a=2, b=25, Max=5	Mode: NType 3, a=1, b=2, Max=15	Mode: GType 4, a=1, b=8, Max=3
S1-4	E-Learning	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S1-5	E-Social	OFF	Select a ...	Select a ...	Select a ...	Select a ...

Multi Media Services (MMS)						
MMS-User Number	Service Type	Status	MMS-Start of Session	MMS-Duration	MMS-Session Probability	MMS-Gap Probability
S2-1	VoD UHD 2160P	ON	Mode: STType 2, a=14, b=14, Var=0.05	Mode: DType 2, a=4, b=25, Max=5	Mode: NType 1, a=1, b=1, Max=15	Mode: GType 2, a=1, b=1.2, Max=3
S2-2	VoD FHD 1080P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-3	VoD HD 720P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-4	VoD SD 480P	ON	Mode: STType 3, a=14, b=3, Var=0.05	Mode: DType 3, a=8, b=25, Max=5	Mode: NType 4, a=1, b=8, Max=15	Mode: GType 3, a=1, b=2, Max=3
S2-5	VC HD 720P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-6	VC SD 480P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-7	VC LD 240P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-8	Online Gaming	ON	Mode: User def., a=3, b=3, Var=0.01	Mode: User def., a=2, b=12, Max=8	Mode: User def., a=1, b=5, Max=5	Mode: User def., a=1, b=4, Max=1
S2-9	VoIP	OFF	Select a ...	Select a ...	Select a ...	Select a ...

Pure Data Services (PDS)						
PDS-User Number	Service Type	Status	PDS-Start of Session	PDS-Duration	PDS-Session Probability	PDS-Gap Probability
S3-1	File Sharing	ON	Mode: STType 1, a=3, b=14, Var=0.05	Mode: DType 1, a=2, b=25, Max=5	Mode: NType 1, a=1, b=1, Max=15	Mode: GType 1, a=1, b=1, Max=3
S3-2	Data Backup	OFF	Select a ...	Select a ...	Select a ...	Select a ...

### Beta Function Parameter input

Two methods are provided, either pre-defined or user customized. Individual apply button can be used to latch in the statistical parameters providing an example trial result.

Internet Surfing Services (ISS)						
ISS-User Number	Service Type	Status	ISS-Start of Session	ISS-Duration	ISS-Session Probability	ISS-Gap Probability
S1-1	E-Life	ON	Mode: STType 1, a=3, b=14, Var=0.05	Mode: DType 1, a=2, b=25, Max=5	Mode: NType 1, a=1, b=1, Max=15	Mode: GType 1, a=1, b=1, Max=3
S1-2	E-Entertainment	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S1-3	E-Commerce	ON	Mode: STType 2, a=14, b=14, Var=0.05	Mode: DType 1, a=2, b=25, Max=5	Mode: NType 3, a=1, b=2, Max=15	Mode: GType 4, a=1, b=8, Max=3
S1-4	E-Learning	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S1-5	E-Social	OFF	Select a ...	Select a ...	Select a ...	Select a ...

Multi Media Services (MMS)						
MMS-User Number	Service Type	Status	MMS-Start of Session	MMS-Duration	MMS-Session Probability	MMS-Gap Probability
S2-1	VoD UHD 2160P	ON	Mode: STType 2, a=14, b=14, Var=0.05	Mode: DType 2, a=4, b=25, Max=5	Mode: NType 1, a=1, b=1, Max=15	Mode: GType 2, a=1, b=1.2, Max=3
S2-2	VoD FHD 1080P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-3	VoD HD 720P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-4	VoD SD 480P	ON	Mode: STType 3, a=14, b=3, Var=0.05	Mode: DType 3, a=8, b=25, Max=5	Mode: NType 4, a=1, b=8, Max=15	Mode: GType 3, a=1, b=2, Max=3
S2-5	VC HD 720P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-6	VC SD 480P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-7	VC LD 240P	OFF	Select a ...	Select a ...	Select a ...	Select a ...
S2-8	Online Gaming	ON	Mode: User def., a=3, b=3, Var=0.01	Mode: User def., a=2, b=12, Max=8	Mode: User def., a=1, b=5, Max=5	Mode: User def., a=1, b=4, Max=1
S2-9	VoIP	OFF	Select a ...	Select a ...	Select a ...	Select a ...

Pure Data Services (PDS)						
PDS-User Number	Service Type	Status	PDS-Start of Session	PDS-Duration	PDS-Session Probability	PDS-Gap Probability
S3-1	File Sharing	ON	Mode: STType 1, a=3, b=14, Var=0.05	Mode: DType 1, a=2, b=25, Max=5	Mode: NType 1, a=1, b=1, Max=15	Mode: GType 1, a=1, b=1, Max=3
S3-2	Data Backup	OFF	Select a ...	Select a ...	Select a ...	Select a ...

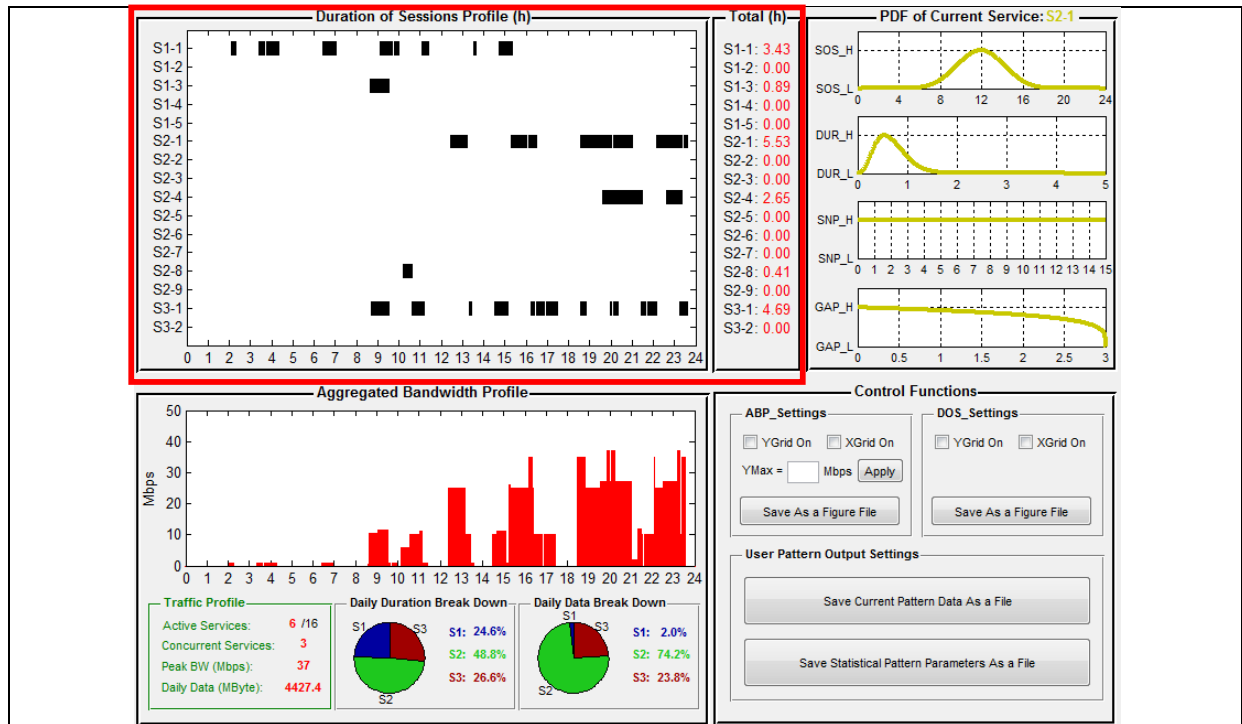
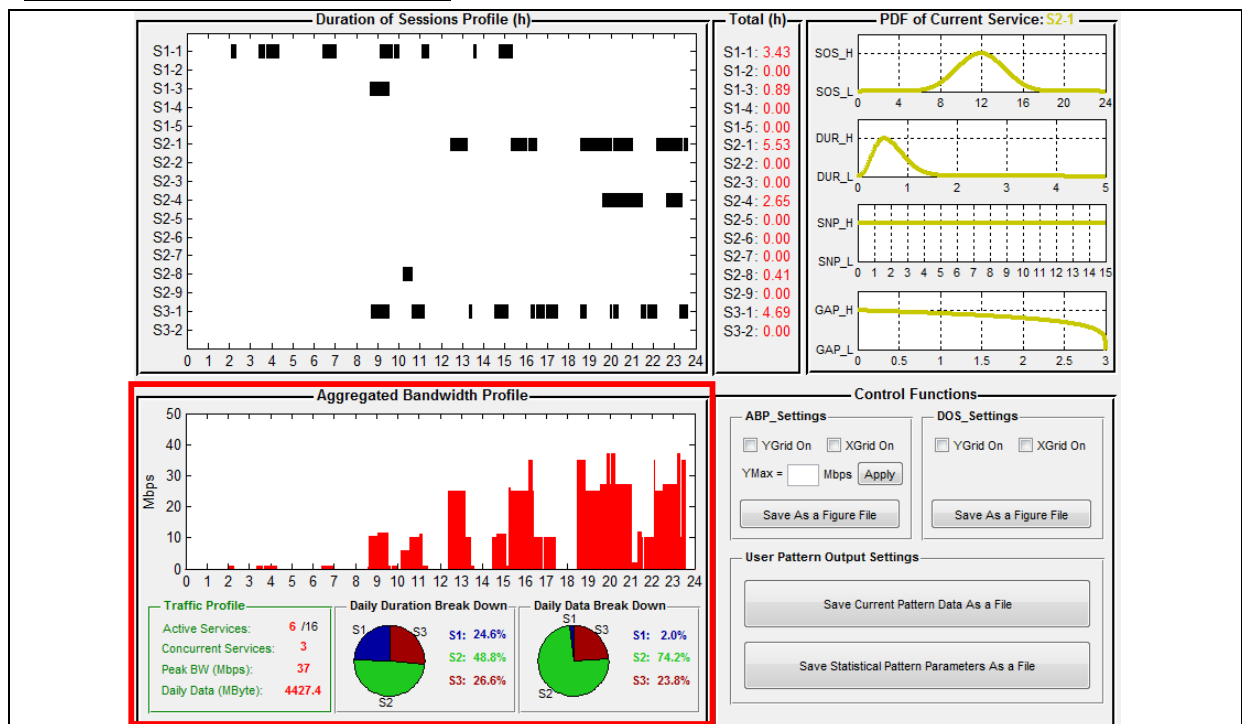
### Pre-defined Parameter Value

Function name	Predefined Beta function Paramters
Start of Session (SOS)	3-14-0.05; 14-14-0.05; 14-3-0.05
Duration (Dur)	2-15-5; 4-15-5; 8-15-5
Session Probability (SNP)	1-1-15; 1-1.2-15; 1-2-15; 1-8-15

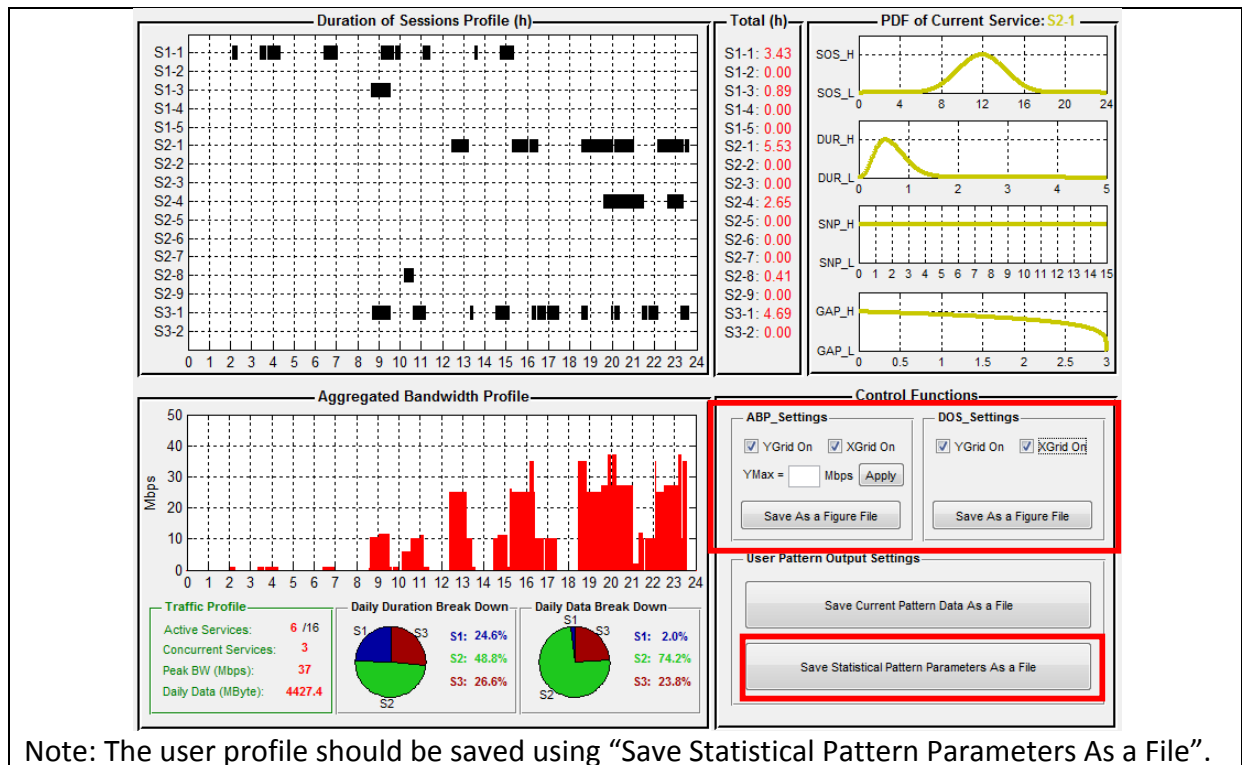


Gap Probability (GAP)

1-1-3; 1-1.2-3; 1-2-3; 1-8-3

*Duration Aggregation and distribution**Measurement of the current trial*

## Control and Export



## 5. Traffic Flow Generator

### 5.1 Introduction

Taking the service profile and user profiles as parts of input, the Traffic Flow Generator will generate traffic flow matrix for a number of given metro core nodes, which are specified in a given txt file or can be statistically generated within this tool. Corresponding measurement and processing status are also provided, and the traffic matrix can be replayed as well.

Traffic Flow Generator (V1.0a) (Designed by Dr. Lei Guan lei.guan.tcd@gmail.com)

Close Restart Help About

### Traffic Flow (Matrix) Generator Lite Version (V1.0a)

**Network Properties Set-up and Configure Information**

**MC Nodes Generation**

☒ PreGen ☐ CurGen

Number of Total Nodes:  (5 to 50)

User Number Distribution of MC Nodes: Min:  K (1 to 1000) Max:  K (1 to 1000)

Percent of P2P Nodes:  (0 to 100 %)

Percent of DC Nodes:  (0 to 100 %)

Percent of IX Nodes:  (0 to 100 %)

**Network Configuration**

Service Profile Load:

User Profile Number: ☐ 3 ☐ 6

User Profile Percent: Sel 1 from 3 UPs Sel 1 from 6 UPs

Possible Range of Next Value: 0 to 100.0%

No. X UP:

**Overall Parameters**

Total Number of MC Nodes:	0	No. of P2P Nodes:	0
Large Node No. (>500k Users):	0	No. of DC Nodes:	0
User No. (Smallest Node):	0	No. of IX Nodes:	0
User No. (Largest Node):	0	User No. (P2P):	0
User No. (Average Node):	0	User No. (DC):	0
Total Number of Users:	0	User No. (IX):	0

SP Configure Status: To be Loaded

	1	2	3	4	5	6	Configure Status
UP Status (Binary):	0	0	0	0	0	0	0 /X Done
UP Percentage:	0	0	0	0	0	0	0 /X Done

**Output Settings**

**Traffic Status**

Waiting for Checking Para.

TrafficT: 0 TB

TrafficA/I/I: 0 TB

TrafficA/U: 0 GB

TrafficT\_P2P: 0 TB

TrafficT\_DC: 0 TB

TrafficT\_IX: 0 TB

**Operations**

**Traffic Replay Settings**

**Traffic Type**

☐ Peer to Peer (P2P)

☐ Data Center (DC)

☐ Internet Exchange (IX)

**Traffic Class**

☐ Class 1 ☐ Class 2

☐ Class 3 ☐ Class 4

☐ Class 5 ☐ Class 6

**Traffic Precision**

☐ 5 mins ☐ 10 mins

☒ 15 mins ☐ 20 mins

☐ 30 mins ☐ 60 mins

**Operations**

**Node Selection**

Range: (1 to 50)

R1	R2	R3	R4	R5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C1	C2	C3	C4	C5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Traffic Replay Illustration**

Current Time: 0.00 Time Precision: 15 mins

Time Slider: 0  24

Active Traffic Type: Peer to Peer Data Center Internet Exchange

Active Traffic Class: Class 1 Class 2 Class 3 Class 4 Class 5 Class 6

**Traffic Matrix Across Selected MC Nodes (Gbps)**

	MC 1 (D)	MC 2 (D)	MC 3 (D)	MC 4 (D)	MC 5 (D)
MC 1 (S)					
MC 2 (S)					
MC 3 (S)					
MC 4 (S)					
MC 5 (S)					

## 5.2 Working Flow

### Import MC Node Configuration

Firstly, load MC node information from a proper file, and corresponding statistical information of this network will be analyzed and shown.

Network Properties Set-up and Configure Information

**MC Nodes Generation**

☒ PreGen ☐ CurGen

Number of Total Nodes:  (5 to 50)

User Number Distribution of MC Nodes: Min:  K (1 to 1000) Max:  K (1 to 1000)

Percent of P2P Nodes:  (0 to 100 %)

Percent of DC Nodes:  (0 to 100 %)

Percent of IX Nodes:  (0 to 100 %)

**Network Configuration**

Service Profile Load:

User Profile Number: ☐ 3 ☐ 6

User Profile Percent: Sel 1 from 3 UPs Sel 1 from 6 UPs

Possible Range of Next Value: 0 to 100.0%

No. X UP:

**Overall Parameters**

Total Number of MC Nodes:	10	No. of P2P Nodes:	8 (80.0%)
Large Node No. (>500k Users):	4	No. of DC Nodes:	6 (60.0%)
User No. (Smallest Node):	42k	No. of IX Nodes:	3 (30.0%)
User No. (Largest Node):	923k	User No. (P2P):	2883k
User No. (Average Node):	395.0k	User No. (DC):	1596k
Total Number of Users:	3951k	User No. (IX):	1610k

SP Configure Status: To be Loaded

	1	2	3	4	5	6	Configure Status
UP Status (Binary):	0	0	0	0	0	0	0 /X Done
UP Percentage:	0	0	0	0	0	0	0 /X Done

### Import Pre-generated Service Profile

Network Properties Set-up and Configure Information

**MC Nodes Generation**

☒ PreGen ☐ CurGen

Number of Total Nodes:  (5 to 50)

User Number Distribution of MC Nodes: Min:  K (1 to 1000) Max:  K (1 to 1000)

Percent of P2P Nodes:  (0 to 100 %)

Percent of DC Nodes:  (0 to 100 %)

Percent of IX Nodes:  (0 to 100 %)

**Network Configuration**

Service Profile Load:

User Profile Number: ☐ 3 ☐ 6

User Profile Percent: Sel 1 from 3 UPs Sel 1 from 6 UPs

Possible Range of Next Value: 0 to 100.0%

No. X UP:

**Overall Parameters**

Total Number of MC Nodes:	10	No. of P2P Nodes:	8 (80.0%)
Large Node No. (>500k Users):	4	No. of DC Nodes:	6 (60.0%)
User No. (Smallest Node):	42k	No. of IX Nodes:	3 (30.0%)
User No. (Largest Node):	923k	User No. (P2P):	2883k
User No. (Average Node):	395.0k	User No. (DC):	1596k
Total Number of Users:	3951k	User No. (IX):	1610k

SP Configure Status: **SP Loaded**

	1	2	3	4	5	6	Configure Status
UP Status (Binary):	0	0	0	0	0	0	0 /X Done
UP Percentage:	0	0	0	0	0	0	0 /X Done

### Import Pre-generated User Profile

**Network Properties Set-up and Configure Information**

**MC Nodes Generation**

☒ PreGen ☐ CurGen

Number of Total Nodes:  (5 to 50)

User Number Distribution of MC Nodes: Min:  K (1 to 1000) Max:  K (1 to 1000)

Percent of P2P Nodes:  (0 to 100 %)

Percent of DC Nodes:  (0 to 100 %)

Percent of IX Nodes:  (0 to 100 %)

**Network Configuration**

Service Profile Load:

User Profile Number: ☒ 3 ☐ 6

User Profile Percent: Sel 1 from 3 UPs Sel 1 from 6 UPs

Possible Range of Next Value: 0 to 100.0%

No. X UP:

**Overall Parameters**

Total Number of MC Nodes:	10	No. of P2P Nodes:	8 (80.0%)
Large Node No. (>500k Users):	4	No. of DC Nodes:	6 (60.0%)
User No. (Smallest Node):	42k	No. of IX Nodes:	3 (30.0%)
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User No. (Average Node):	395.0k	User No. (DC):	1596k
Total Number of Users:	3951k	User No. (IX):	1610k

SP Configure Status: SP Loaded

	1	2	3	4	5	6	Configure Status
UP Status (Binary):	1	1	1	0	0	0	3/3 Done
UP Percentage:	0	0	0	0	0	0	0/3 Done

### Assign Percentage Pre-generated User Profile

**Network Properties Set-up and Configure Information**

**MC Nodes Generation**

☒ PreGen ☐ CurGen

Number of Total Nodes:  (5 to 50)

User Number Distribution of MC Nodes: Min:  K (1 to 1000) Max:  K (1 to 1000)

Percent of P2P Nodes:  (0 to 100 %)

Percent of DC Nodes:  (0 to 100 %)

Percent of IX Nodes:  (0 to 100 %)

**Network Configuration**

Service Profile Load:

User Profile Number: ☒ 3 ☐ 6

User Profile Percent: 1st UP Sel 1 from 6 UPs

Possible Range of Next Value: 0 to 60.0%

No.1 UP:  40

**Overall Parameters**

Total Number of MC Nodes:	10	No. of P2P Nodes:	8 (80.0%)
Large Node No. (>500k Users):	4	No. of DC Nodes:	6 (60.0%)
User No. (Smallest Node):	42k	No. of IX Nodes:	3 (30.0%)
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Total Number of Users:	3951k	User No. (IX):	1610k

SP Configure Status: SP Loaded

	1	2	3	4	5	6	Configure Status
UP Status (Binary):	1	1	1	0	0	0	3/3 Done
UP Percentage:	40.0	0	0	0	0	0	1/3 Done

### Colour of status turn to red when parameters have been successfully loaded

**Network Properties Set-up and Configure Information**

**MC Nodes Generation**

☒ PreGen ☐ CurGen

Number of Total Nodes:  (5 to 50)

User Number Distribution of MC Nodes: Min:  K (1 to 1000) Max:  K (1 to 1000)

Percent of P2P Nodes:  (0 to 100 %)

Percent of DC Nodes:  (0 to 100 %)

Percent of IX Nodes:  (0 to 100 %)

**Network Configuration**

Service Profile Load:

User Profile Number: ☒ 3 ☐ 6

User Profile Percent: 3rd UP Sel 1 from 6 UPs

Possible Range of Next Value: 0 to 0.0%

No.3 UP:  20

**Overall Parameters**

Total Number of MC Nodes:	10	No. of P2P Nodes:	8 (80.0%)
Large Node No. (>500k Users):	4	No. of DC Nodes:	6 (60.0%)
User No. (Smallest Node):	42k	No. of IX Nodes:	3 (30.0%)
User No. (Largest Node):	923k	User No. (P2P):	2883k
User No. (Average Node):	395.0k	User No. (DC):	1596k
Total Number of Users:	3951k	User No. (IX):	1610k

SP Configure Status: SP Loaded

	1	2	3	4	5	6	Configure Status
UP Status (Binary):	1	1	1	0	0	0	3/3 Done
UP Percentage:	40.0	40.0	20.0	0	0	0	3/3 Done

### Traffic Generation

**Output Settings**

**Traffic Status**

Waiting for Checking Para.

TrafficT: 0 TB

TrafficA/N: 0 TB

TrafficA/U: 0 GB

TrafficT\_P2P: 0 TB

TrafficT\_DC: 0 TB

TrafficT\_IX: 0 TB

**Operations**

Standby

**Output Settings**

**Traffic Status**

Ready to go !

TrafficT: 0 TB

TrafficA/N: 0 TB

TrafficA/U: 0 GB

TrafficT\_P2P: 0 TB

TrafficT\_DC: 0 TB

TrafficT\_IX: 0 TB

**Operations**

Status Check Done

**Output Settings**

**Traffic Status**

UP 2, Node 1, Stage 1 .

TrafficT: 0 TB

TrafficA/N: 0 TB

TrafficA/U: 0 GB

TrafficT\_P2P: 0 TB

TrafficT\_DC: 0 TB

TrafficT\_IX: 0 TB

**Operations**

Traffic Generating

<div> <b>Output Settings</b>  <b>Traffic Status</b>  <p style="color: red;">Traffic Generation Done !!</p> <p>TrafficT: 58.04 TB</p> <p>TrafficA/N: 5.80 TB</p> <p>TrafficA/U: 0.01 GB</p> <p>TrafficT_P2P: 14.00 TB</p> <p>TrafficT_DC: 28.29 TB</p> <p>TrafficT_IX: 15.75 TB</p> </div> <div> <b>Operations</b>  <div>Check Status of Parameters</div> <div>Traffic Generation For 24h</div> </div>		
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Traffic Generation Done

### Traffic Replay (Default)

Replay the network traffic across default MC nodes at specific time precision.

<b>Traffic Replay Settings</b> <b>Traffic Type</b> <input checked="" type="checkbox"/> Peer to Peer (P2P) <input type="checkbox"/> Data Center (DC) <input checked="" type="checkbox"/> Internet Exchange (IX) <b>Traffic Class</b> <input type="checkbox"/> Class 1 <input type="checkbox"/> Class 2 <input type="checkbox"/> Class 3 <input type="checkbox"/> Class 4 <input type="checkbox"/> Class 5 <input type="checkbox"/> Class 6 <b>Traffic Precision</b> <input type="radio"/> 5 mins <input type="radio"/> 10 mins <input checked="" type="radio"/> 15 mins <input type="radio"/> 20 mins <input type="radio"/> 30 mins <input type="radio"/> 60 mins	<b>Node Selection</b> Range: (1 to 50) R1 R2 R3 R4 R5 C1 C2 C3 C4 C5 <div>Update R(ow) &amp; C(ol)</div> <b>Operations</b> <div>Replay Traffic</div> <div>Save All</div> <div>Save Cur</div>	<b>Traffic Replay Illustration</b> Current Time: 6.25 Time Precision: 15 mins Time Slider 0 24 Active Traffic Type: Peer to Peer Data Center Internet Exchange Active Traffic Class: Class 1 Class 2 Class 3 Class 4 Class 5 Class 6 <table border="1"> <caption>Traffic Matrix Across Selected MC Nodes (Gbps)</caption> <thead> <tr> <th></th> <th>MC 1 (D)</th> <th>MC 2 (D)</th> <th>MC 3 (D)</th> <th>MC 4 (D)</th> <th>MC 5 (D)</th> </tr> </thead> <tbody> <tr> <td>MC 1 (S)</td> <td>0.4235</td> <td>16.5372</td> <td>0.4656</td> <td>0</td> <td>1.2076</td> </tr> <tr> <td>MC 2 (S)</td> <td>0.1562</td> <td>7.8996</td> <td>0.1717</td> <td>0</td> <td>0.4453</td> </tr> <tr> <td>MC 3 (S)</td> <td>0.2707</td> <td>1.2127</td> <td>0.2976</td> <td>0</td> <td>0.7719</td> </tr> <tr> <td>MC 4 (S)</td> <td>0.4006</td> <td>1.7943</td> <td>0.4403</td> <td>13.4400</td> <td>1.1421</td> </tr> <tr> <td>MC 5 (S)</td> <td>0.3157</td> <td>1.4143</td> <td>0.3471</td> <td>12.8800</td> <td>0.9003</td> </tr> </tbody> </table>		MC 1 (D)	MC 2 (D)	MC 3 (D)	MC 4 (D)	MC 5 (D)	MC 1 (S)	0.4235	16.5372	0.4656	0	1.2076	MC 2 (S)	0.1562	7.8996	0.1717	0	0.4453	MC 3 (S)	0.2707	1.2127	0.2976	0	0.7719	MC 4 (S)	0.4006	1.7943	0.4403	13.4400	1.1421	MC 5 (S)	0.3157	1.4143	0.3471	12.8800	0.9003
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Default active nodes are MC1, MC2, MC3, MC4, MC5.

### Traffic Replay (Customized)

Replay the network traffic across selected MC nodes at specific time precision.

<b>Traffic Replay Settings</b> <b>Traffic Type</b> <input checked="" type="checkbox"/> Peer to Peer (P2P) <input checked="" type="checkbox"/> Data Center (DC) <input type="checkbox"/> Internet Exchange (IX) <b>Traffic Class</b> <input type="checkbox"/> Class 1 <input type="checkbox"/> Class 2 <input type="checkbox"/> Class 3 <input type="checkbox"/> Class 4 <input type="checkbox"/> Class 5 <input type="checkbox"/> Class 6 <b>Traffic Precision</b> <input checked="" type="radio"/> 5 mins <input type="radio"/> 10 mins <input type="radio"/> 15 mins <input type="radio"/> 20 mins <input type="radio"/> 30 mins <input type="radio"/> 60 mins	<b>Node Selection</b> Range: (1 to 50) R1 R2 R3 R4 R5 C1 C2 C3 C4 C5 <div>Update R(ow) &amp; C(ol)</div> <b>Operations</b> <div>Replay Traffic</div> <div>Save All</div> <div>Save Cur</div>	<b>Traffic Replay Illustration</b> Current Time: 8.92 Time Precision: 5 mins Time Slider 0 24 Active Traffic Type: Peer to Peer Data Center Internet Exchange Active Traffic Class: Class 1 Class 2 Class 3 Class 4 Class 5 Class 6 <table border="1"> <caption>Traffic Matrix Across Selected MC Nodes (Gbps)</caption> <thead> <tr> <th></th> <th>MC 3 (D)</th> <th>MC 4 (D)</th> <th>MC 6 (D)</th> <th>MC 9 (D)</th> <th>MC 10 (D)</th> </tr> </thead> <tbody> <tr> <td>MC 1 (S)</td> <td>2.5278</td> <td>2.2767</td> <td>1.7427</td> <td>2.2767</td> <td>2.3560</td> </tr> <tr> <td>MC 2 (S)</td> <td>6.6015</td> <td>6.1083</td> <td>3.4224</td> <td>6.1083</td> <td>6.2641</td> </tr> <tr> <td>MC 3 (S)</td> <td>3.0682</td> <td>2.7767</td> <td>2.0231</td> <td>2.7767</td> <td>2.8687</td> </tr> <tr> <td>MC 6 (S)</td> <td>1.4414</td> <td>1.3000</td> <td>0.9812</td> <td>1.3000</td> <td>1.3446</td> </tr> <tr> <td>MC 8 (S)</td> <td>2.8930</td> <td>2.6533</td> <td>1.6633</td> <td>2.6533</td> <td>2.7290</td> </tr> </tbody> </table>		MC 3 (D)	MC 4 (D)	MC 6 (D)	MC 9 (D)	MC 10 (D)	MC 1 (S)	2.5278	2.2767	1.7427	2.2767	2.3560	MC 2 (S)	6.6015	6.1083	3.4224	6.1083	6.2641	MC 3 (S)	3.0682	2.7767	2.0231	2.7767	2.8687	MC 6 (S)	1.4414	1.3000	0.9812	1.3000	1.3446	MC 8 (S)	2.8930	2.6533	1.6633	2.6533	2.7290
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