OPNET/Riverbed Modeler: Deploying Standard Applications

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Lecture № 8

Outline

Application architectures

2 Adding traffic

- 3 Application Config
- 4 Configuring standard applications
 - Database
 - Email
 - Ftp
 - Http
 - Print
 - Peer-to-peer File Sharing
 - Remote Login
 - Video Conferencing
 - Video Streaming
 - Voice

Outline

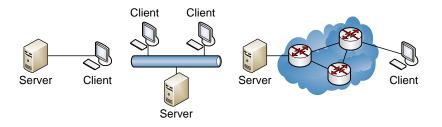
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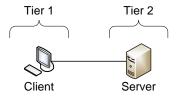
Application Architectures

- End systems can be made to communicate and share resources according to different interaction models
- 2 fundamental interaction models :
 - Client/server
 - Peer-to-peer (aka P2P)
- These models are relevant to end systems only, regardless of how the end systems are connected to each other

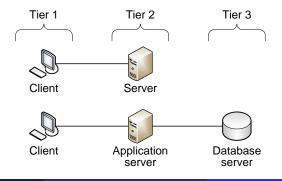


- In the client/server model, all end systems are divided into clients and servers each designed for specific purposes
- Clients have an active role and initiate a communication session by sending requests to servers
 - Clients must have knowledge of the available servers and the services they provide
 - Clients can communicate with servers only; they cannot see each other
- **Servers** have a **passive** role and respond to their clients by acting on each request and returning results
 - One server usually supports numerous clients
- The purpose of servers is to provide some service(s) to clients

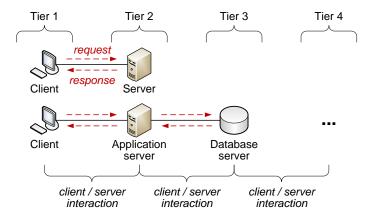
- **1-tier architecture** used to describe centralized architectures in which all of the processing is done on a single host
 - Users can access such systems (aka **mainframes**) through display terminals (aka **dumb terminals**) but what is displayed and how it appears is controlled by the mainframe
- **2-tier architecture** (aka flat) used to describe client/server application architectures, where clients request resources and servers respond directly to these requests, using there own resources



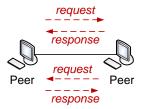
- **3-tier architecture** used to describe client/server application architectures consisting of:
 - Clients which request services
 - **Application servers** whose task is to provide the requested resources, but by calling on database servers
 - **Database servers** which provide the application servers with the data they require



• **N-tier architecture** – used to describe client/server application architectures consisting of more than 3 tiers



- In the P2P model, there is minimal (or no) reliance on dedicated servers; instead the application exploits direct communication between pairs of intermittently connected end systems, called **peers**
 - The peers are not owned by the service provider, but are instead desktops and laptops controlled by users, with most of the peers residing in homes, universities, and offices
 - The participants are equal and simultaneously function as both resource providers (servers) and resource requestors (clients)



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Adding Traffic

- Adding traffic an important step in network modeling and simulation
- Application traffic traveling through the network enables us to observe the behavior and study the performance of various network protocols in their operational environment
- Without it, the network is only populated with the control packets generated by certain protocols upon initialization or periodically



Adding Traffic (cont'd)

- With OPNET/Riverbed, you can model the following types of traffic:
 - Explicit (aka 'discrete') traffic
 - Background (aka 'analytical') traffic
 - Hybrid traffic (explicit + background)
- Explicit traffic provides a very accurate description of traffic behavior, which is achieved by modeling the complete life cycle of every packet generated by the traffic sources
 - I.e., packet created, packet queued, packet transmitted, etc.
- Explicit traffic modeling provides the most accurate results because it simulates all protocol effects
- However, this also results in longer simulation execution time and higher memory usage (because the simulation allocates memory for each individual packet)

Adding Traffic (cont'd)

- **Background traffic** provides an analytical, and therefore less accurate, representation of data transfer over the network
- The occupancy of the queues at the intermediate nodes is adjusted based on the configuration of the background traffic models, which in turn influences the delays and other performance measures of the corresponding simulated protocols and network devices
- Background traffic modeling does not simulate the life cycle of individual packets; instead, it employs an analytical representation of traffic behavior
- Therefore, a simulation study that includes background traffic models will execute faster and will consume less memory than a simulation study that uses explicit traffic models

Adding Traffic (cont'd)

- Hybrid traffic combines the advantages of both approaches by using explicit models and obtaining an accurate representation of those traffic sources that require a detailed evaluation, while employing background models for the traffic sources that do not require accurate representation
- Hybrid modeling provides greater accuracy over background traffic modeling, while using fewer resources and speeding up execution as compared to explicit traffic modeling
- In practice, simulation studies often rely on a combination of explicit and background models

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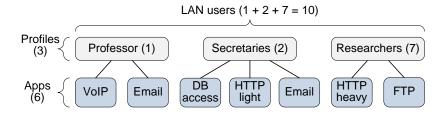
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Application Config

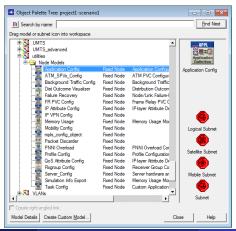
- In OPNET/Riverbed, deploying applications actually means defining user profiles and applications to be simulated
- Application Config specifies standard and custom applications used in the simulation, including traffic and QoS parameters
 - Standard applications (Light/Medium/Heavy/etc.): Database, Email, FTP, HTTP, Print, Peer-to-peer File Sharing, Remote Login, Video Conferencing, Video Streaming, Voice
- **Profile Config** specifies the activity patterns of a user or groups of users in terms of the applications used over a period of time
 - When does a user start using applications?
 - What is the duration of his/her activity?
 - What applications does he/she use?
 - How often does he/she use each application?
 - etc.

• Example of 3 user profiles on a small office network:

- User profile 'Professor' represents a head of department who only runs VoIP and Email applications
- User profile 'Secretary' represents a clerk whose duties involve Email, light Web surfing, and database access
- User profile 'Researcher' represents an employee actively surfing the Web and accessing FTP sites

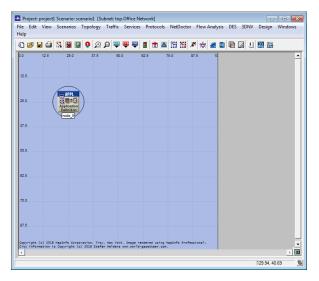


- Open Object Palette \Rightarrow
 - $\bullet \Rightarrow \mathsf{Shared \ Object \ Palettes} \Rightarrow \mathsf{internet_toolbox} \Rightarrow \mathsf{Node \ Models}$
 - $\bullet \ \Rightarrow \mathsf{Shared} \ \mathsf{Object} \ \mathsf{Palettes} \Rightarrow \mathsf{applications} \Rightarrow \mathsf{Node} \ \mathsf{Models}$
 - \Rightarrow Shared Object Palettes \Rightarrow utilities \Rightarrow Node Models



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• A simulated scenario should contain only 1 Application Config object



- By default, Number of Rows = 0
 - I.e., no applications configured in the current scenario

Project: project1 Scenario: scenario1 (Subnet: to ile Edit View Scenarios Topology Traffic Ielp		analysis DES 3DNV Design Windows
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• Number of Rows = N results in N application definition entries

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• OPNET Modeler 14.5 vs. Riverbed Modeler Academic Edition

- + Peer-to-peer File Sharing
- + Video Streaming

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Email	Off
Ptp	Off
Http	Off
Print	Off
Remote Login	Off
Video Conferencing	Off
Voice	Off
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?	- Rp	Off
3	- Http	Off
0	- Print	Off
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1	Video Streaming	Off
1	- Voice	Off
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• Only one application type can be set per application name!

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	Enter Apolication Name	3
	- Name	Enter Application Name
,)	Description	()
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)	Database	High Load
)	- Email	Off
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)	Print	Off
)	- Remote Login	Off
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Outline

Application architectures

2 Adding traffic

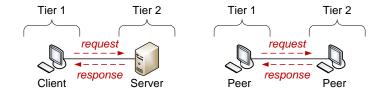
3 Application Config

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Configuring Standard Applications

- Standard applications are implemented in a 2-tier architecture
 - A client issues a request and a server or another client (peer) receives the request and returns a response
 - This request-response exchange typically happens within one communication session between client and server or between peers



• **Custom applications** allow modeling applications with more than 2 tiers, where a client request can be forwarded through multiple servers before a response message is sent back

• **Database** – models a protocol that executes 2 types of database operations: query and entry

Attrik	oute	Value			
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(2) = A	pplication Definitions	()			
Number of Rows		1			
E	Enter Application Name				
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	Description	()			
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- Custom	Off			
?	- Database	Off			
?	- Email	Off			
?	- Ptp	Low Load Medium Load			
?	- Http	High Load			
0	- Print	Edit			
0	Peer-to-peer File Sharing	Off			
3	- Remote Login	Off			
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0	Voice	Off			
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🕐 🖲 V	oice Encoder Schemes	All Schemes			
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Database query

- A 512-byte query message that carries the database request
- A response message that carries the data

Database entry

- An entry message that carries the data
- A 512-byte response message that carries the database acknowledgement of the operation
- All database queries or entries are transmitted over a single transport connection
- The default transport protocol = **TCP**

• Low Load vs. Medium Load vs. High Load

- Each of the preset values is configured to execute 100% of query transactions
- The only difference is the size of the transaction response and the frequency of transaction arrival

🚺 (Database) Table			🚺 (Database) Table	•		🚺 (Database) Table	×
Attribute	Value	<u>^</u>	Attribute	Value	·	Attribute	Value
Transaction Mix (Queries/Total Transactions)	100%		Transaction Mix (Queries/Total Transactions)	100%		Transaction Mix (Queries/Total Transactions)	100%
Transaction Interarrival Time (seconds)	exponential (30)		Transaction Interarrival Time (seconds)	exponential (12)		Transaction Interarrival Time (seconds)	exponential (12)
Transaction Size (bytes)	constant (16)		Transaction Size (bytes)	constant (512)		Transaction Size (bytes)	constant (32768)
Symbolic Server Name	Database Server		Symbolic Server Name	Database Server		Symbolic Server Name	Database Server
Type of Service	Best Effort (0)		Type of Service	Best Effort (0)		Type of Service	Best Effort (0)
RSVP Parameters	None		RSVP Parameters	None		RSVP Parameters	None
Back-End Custom Application	Not Used		Back-End Custom Application	Not Used		Back-End Custom Application	Not Used
		*		v	1		v
Details Promote	<u>Q</u> K <u>C</u> an	cel	Details Promote	<u>Q</u> K <u>C</u> ancel		Details Promote	QK Cancel

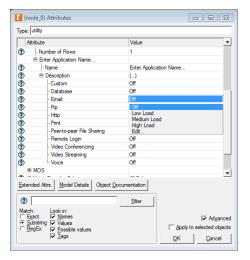
- Transaction Mix (Queries/Total Transactions) percentage of queries among all database transactions
 - 0% all database operations are entries
- Transaction Interarrival Time (seconds) time between transactions
 - The start time of the next transaction is computed by adding the value of this attribute to the time when the previous transaction started
 - The next transaction can be initiated before the previous one completes

🚺 (Database) Table	×
Attribute	Value 🔺
Transaction Mix (Queries/Total Transactions)	100%
Transaction Interarrival Time (seconds)	None
Transaction Size (bytes)	None
Symbolic Server Name	Database Server
Type of Service	Best Effort (0)
RSVP Parameters	None
Back-End Custom Application	Not Used
	~
Details Promote	<u>O</u> K <u>C</u> ancel

- Transaction Size (bytes) size of an entry message or a response message to a database query
- Symbolic Server Name common symbolic name for all the nodes that operate as database servers for a given application definition
 - Typically, the value of this attribute remains unchanged
 - This attribute is part of every standard application definition

Attribute	Value	
Transaction Mix (Queries/Total Transactions)	100%	
Transaction Interarrival Time (seconds)	None	
Transaction Size (bytes)	None	
Symbolic Server Name	Database Server	
Type of Service	Best Effort (0)	
RSVP Parameters	None	
Back-End Custom Application	Not Used	
		-
Details Promote	OK Cance	

• **Email** – models message exchange between an e-mail client and an e-mail server



• Sending a group of e-mail messages

- A group of e-mail messages from the client
- A 16-byte response message from the server
- 3 A 8-byte close confirmation message from the server

• Receiving a group of e-mail messages

- A 16-byte request message from the client
- 2 A group of e-mail messages from the server
- A 8-byte close confirmation message from the server
- Each group of e-mails to be uploaded or downloaded creates a new transport connection with the server

• The default transport protocol = TCP

• Low Load vs. Medium Load vs. High Load

- Each of the preset values is configured to send and receive 3 e-mail messages per group
- The main difference is the size of e-mail messages and the frequency of transactions

🚺 (Email) Table		EXE	🚺 (Email) Table			🚺 (Email) Table		• ו
Attribute	Value	-	Attribute	Value	•	Attribute	Value	-
Send Interarrival Time (seconds)	exponential (3600)		Send Interarrival Time (seconds)	exponential (720)		Send Interamival Time (seconds)	exponential (360)	
Send Group Size	constant (3)		Send Group Size	constant (3)		Send Group Size	constant (3)	
Receive Interarrival Time (seconds)	exponential (3600)		Receive Interarrival Time (seconds)	exponential (720)		Receive Interarrival Time (seconds)	exponential (360)	
Receive Group Size	constant (3)		Receive Group Size	constant (3)		Receive Group Size	constant (3)	
E-Mail Size (bytes)	constant (500)		E-Mail Size (bytes)	constant (1000)		E-Mail Size (bytes)	constant (2000)	
Symbolic Server Name	Email Server		Symbolic Server Name	Email Server		Symbolic Server Name	Email Server	
Type of Service	Best Effort (0)		Type of Service	Best Effort (0)		Type of Service	Best Effort (0)	
RSVP Parameters	None	-1	RSVP Parameters	None	-	RSVP Parameters	None	
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- Send Interarrival Time (seconds) time between groups of e-mails sent from the client
 - The start time of the next transaction is computed by adding the value of this attribute to the time when the previous transaction started
 - The next transaction can be initiated before the previous one completes
- Receive Interarrival Time (seconds) time between groups of e-mails received from the server
 - Send and receive interarrival times are independent (e.g., a client can be a frequent sender of messages but an infrequent recipient)

🚺 (Email) Table	×
Attribute	Value
Send Interarrival Time (seconds)	None
Send Group Size	constant (3)
Receive Interarrival Time (seconds)	None
Receive Group Size	constant (3)
E-Mail Size (bytes)	exponential (1024)
Symbolic Server Name	Email Server
Type of Service	Best Effort (0)
RSVP Parameters	None _1
Details Promote	<u>OK</u> <u>Cancel</u>

- Send Group Size number of e-mail messages per group of e-mails to be uploaded
- Receive Group Size number of e-mail messages per group of e-mails to be downloaded
- E-Mail Size (bytes) size of a single e-mail message

[[(Email) Table	×
Attribute	Value 🔺
Send Interarrival Time (seconds)	None
Send Group Size	constant (3)
Receive Interarrival Time (seconds)	None
Receive Group Size	constant (3)
E-Mail Size (bytes)	exponential (1024)
Symbolic Server Name	Email Server
Type of Service	Best Effort (0)
RSVP Parameters	None
DIFICT ARE	······
Details Promote	<u>Q</u> K <u>C</u> ancel

• **Ftp** – models 2 primary FTP operations for data transfer between a client and a server: GET and PUT

Attrik	oute	Value
1	Number of Rows	1
6	Enter Application Name	
3	- Name	Enter Application Name
3	Description	()
2	- Custom	Off
9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	- Database	Off
2	- Email	Off
0	- Ftp	Off
3	- Http	Off
2	- Print	Low Load
2	- Peer-to-peer File Sharing	Medium Load High Load
0	- Remote Login	Edit
3	 Video Conferencing 	Off
2	- Video Streaming	Off -
3	. Voice	Off
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Sub:	string 🔽 Values	Apply to selected objects

• GET

- A 512-byte file request from the client
- 2 A file downloaded from the server
- A 8-byte close confirmation message from the server

PUT

- A file uploaded by the client
- A 512-byte confirmation response from the server
- A 8-byte close confirmation message from the server
- Unlike in real networks, this FTP model sends control and data messages over the same transport connection
 - Each file transfer creates a new transport connection with the server
- The default transport protocol = **TCP**

• Low Load vs. Medium Load vs. High Load

- Each of the preset values is configured to have all FTP operations evenly distributed between GET and PUT operations
- The main difference is the size of transferred files and the frequency of transactions

🚺 (Ftp) Table			[] (Ftp) Table				(Ftp) Table		×
Attribute	Value	<u>^</u>	Attribute	Value	<u>^</u>	Att	tribute	Value	
Command Mix (Get/Total)	50%		Command Mix (Get/Total)	50%		Co	mmand Mix (Get/Total)	50%	
Inter-Request Time (seconds)	exponential (3600)		Inter-Request Time (seconds)	exponential (720)		Int	er-Request Time (seconds)	exponential (360)	
File Size (bytes)	constant (1000)		File Size (bytes)	constant (5000)		File	e Size (bytes)	constant (50000)	
Symbolic Server Name	FTP Server		Symbolic Server Name	FTP Server		Syn	mbolic Server Name	FTP Server	
Type of Service	Best Effort (0)		Type of Service	Best Effort (0)		Ty	pe of Service	Best Effort (0)	
RSVP Parameters	None		RSVP Parameters	None		RS	SVP Parameters	None	
Back-End Custom Application	Not Used		Back-End Custom Application	Not Used		Ba	ck-End Custom Application	Not Used	
		~			~				-
Details Promote	<u>O</u> K <u>C</u> ar	ncel	Details Promote	<u>Q</u> K <u>C</u> ar	cel		Details Promote	<u>O</u> K <u>C</u> a	ncel

- Command Mix (Get/Total) percentage of GET operations among all FTP operations
 - 0% all FTP operations are PUT ones
- Inter-Request Time (seconds) time between consecutive FTP operations
 - The start time of the next FTP operation is computed by adding the value of this attribute to the time when the previous operation started
 - The next operation can be initiated before the previous one completes

🚺 (Ftp) Table	×	
Attribute	Value	I
Command Mix (Get/Total)	100%	
Inter-Request Time (seconds)	None	
File Size (bytes)	None	
Symbolic Server Name	FTP Server	
Type of Service	Best Effort (0)	
RSVP Parameters	None	
Back-End Custom Application	Not Used	
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Details Promote	<u>Q</u> K <u>C</u> ancel]

• Http – models Web browsing activity where a client periodically contacts servers to retrieve web pages

Attrib	oute	Value
2	Number of Rows	1
	Enter Application Name	
3	Name	Enter Application Name
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0	· Database	Off
0	- Email	Off
?	- Ptp	Off
?	- Http	Off
3	- Print	Off
0	 Peer-to-peer File Sharing 	Light Browsing Heavy Browsing
0	- Remote Login	Searching
?	 Video Conferencing 	Image Browsing
3	 Video Streaming 	Web TV
?	- Voice	Edit
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Network Modeling & Simulation

Web browsing

- The user downloads a page from a Web server
- The page contains text and graphic information, and sometimes video
- These page elements are collectively referred to as 'inline objects'
- Each HTTP page request may result in opening multiple TCP connections for transferring the contents of the inline objects embedded in the page
- The number of concurrent TCP connections is determined by the application configuration
- The default transport protocol = **TCP**

• Light Browsing vs. Heavy Browsing vs. Searching

Page Interantival Time (seconds) exponential (720) Page Properties () Server Selection () RSVP Parameters None	Attribute	Value	^
Page Properties () Server Selection () RSVP Parameters None	HTTP Specification	HTTP 1.1	
Server Selection () RSVP Parameters None	Page Interarrival Time (seco	onds) exponential (720)	
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Type of Service Best Effort (0)	RSVP Parameters	None	
	Type of Service	Best Effort (0)	
			*

Attribute	Value	^
HTTP Specification	HTTP 1.1	
Page Interarrival Time (sec	conds) exponential (60)	
Page Properties	(_)	
Server Selection	(L.)	
RSVP Parameters	None	
Type of Service	Best Effort (0)	
		-

Attribute	Value
HTTP Specification	HTTP 1.1
Page Interarrival Time (seconds)	exponential (10)
Page Properties	(_)
Server Selection	(_)
RSVP Parameters	None
Type of Service	Best Effort (0)

• Image Browsing vs. Web TV vs. Video Browsing

Attribute	Value
HTTP Specification	HTTP 1.1
Page Interarrival Time (se	conds) exponential (10)
Page Properties	
Server Selection	(\rightarrow)
RSVP Parameters	None
Type of Service	Best Effort (0)
	v
Details Prom	te OK Cancel

Attribute	Value
HTTP Specification	HTTP 1.1
Page Interarrival Time (seco	nds) exponential (1800)
Page Properties	
Server Selection	(\rightarrow)
RSVP Parameters	None
Type of Service	Best Effort (0)
	~
Details Promote	OK Cancel

Attribute	Value
HTTP Specification	HTTP 1.1
Page Interarrival Time (seconds)	exponential (360)
Page Properties	
Server Selection	()
RSVP Parameters	None
Type of Service	Best Effort (0)

- HTTP Specification how the inline objects are requested and transferred
 - HTTP 1.0 uses a nonpersistent connection where each inline object is requested and transmitted over a separate TCP connection
 - HTTP 1.1 persistent connections where the inline objects are transmitted over the same TCP connection
 - Pipelining HTTP 1.1 combines multiple requests for the inline objects into a single message

Attribute	Value
HTTP Specification	HTTP 1.1
Page Interarrival Time (seconds)	
Page Properties	HTTP 1.0 Microsoft Internet Explorer 5.0
Server Selection	Netscape Communicator 4.0
RSVP Parameters	Microsoft Internet Explorer 8 (IE8)
Type of Service	Mozilla Firefox Opera 12 Edit

Max Connections 2 Max Idle Period (seconds) constant (10) Number of Pipelined Requests All Inlined Objects in a Page	Attribute	Value
Max Idle Period (seconds) constant (10) Number of Pipelined Requests All Inlined Objects in a Page	HTTP Version	HTTP 1.1
Number of Pipelined Requests All Inlined Objects in a Page	Max Connections	2
	Max Idle Period (seconds)	constant (10)
Request Size (bytes) constant (350)	Number of Pipelined Requests	All Inlined Objects in a Page
	Request Size (bytes)	constant (350)
	Details Promote	OK Cancel
Details Promote OK Cancel		

- Page Properties a web page may contain many objects
 - Text, images and short videos (like ads) are loaded automatically
 - Streamed videos are loaded as soon as a user clicks 'Play'
 - One page can contain at most 1 streamed video object

HTTP Specification	
TTTT Specification	HTTP 1.1
Page Interarrival Time (seconds)	None
Page Properties	()
Server Selection	()
RSVP Parameters	None
Type of Service	Best Effort (0)

Attribute	Value	
Automatically Loaded Page	Objects ()	
Streamed Video Properties	()	

• Automatically Loaded Page Objects

- Each object is represented by a row specification for this attribute
- The first row represents the 'page' itself
- The subsequent rows represent the objects within this page
- The number of objects in the first row is always set to 1 internally

Attribute		Value		A
Automatically Loaded	Page Object	s ()		
Streamed Video Prope	rties	()		
				-

	Object Size (bytes)	Number of Objects (objects per page)	Location	Back-End Custom Application	Object Group Name	
constant (1000)	constant (1000)	constant (1)	HTTP Server	Not Used	HTTP Object	
Medium Image	Medium Image	constant (5)	HTTP Server	Not Used	HTTP Object	
Short Video	Short Video	constant (2)	HTTP Server	Not Used	HTTP Object	
	Small Image Medium Image Large Image					
	Short Video					
	Long Video Edit					
Rows	Delete	Insert	Dyplic	ate M	ove Up Move Down	
Details	Promote	Show row I	abels		OK	Cancel

Streamed Video Properties

- Video Existence Probability probability that a video object is contained in the page
 - 0.0 No Video
 - 1.0 All Pages Include a Video
- Play Start Time Offset (seconds) difference between the time that the page was loaded and the time that the user clicked 'Play'

_
-

Attribute	Value
Video Existence Probability	All Pages Include a Video
Play Start Time Offset (seconds)	exponential (5)
Video Length (seconds)	exponential (300)
Video Type	On Demand
Frame Inter-arrival Time (seconds)	exponential (0.1)
Frame Size (bytes)	poisson (20000)
Location	HTTP Server
Back-End Custom Application	Not Used
01 1 0 N	

• Video Length (seconds) vs. Video Type

- On Demand the server sends back a file of size, in bytes, equal to = Frame Size * Video Length / Frame Inter-arrival Time
- Live a streaming video will be assumed over when its page is closed regardless of the length specified with the 'Video Length' attribute
- The special value 'Until Page Closed' is accepted only for the live videos

Attribute	Value
Video Existence Probability	All Pages Include a Video
Play Start Time Offset (seconds)	exponential (5)
Video Length (seconds)	exponential (300)
Video Type	Edit
Frame Inter-arrival Time (seconds)	exponential (0.1)
Frame Size (bytes)	poisson (20000)
Location	HTTP Server
Back-End Custom Application	Not Used
OF TO N	

Attribute	Value
Video Existence Probability	All Pages Include a Video
Play Start Time Offset (seconds)	exponential (5)
Video Length (seconds)	exponential (300)
Video Type	Until Page Closed
Frame Inter-arrival Time (seconds)	Edit
Frame Size (bytes)	poisson (20000)
Location	HTTP Server
Back-End Custom Application	Not Used
ALC: N	UTTO M. OL .

Server Selection

- Web pages often contain embedded links that point to other web pages
- This attribute specifies if the embedded links point to web pages located on the same server or not
- I.e., whether the web pages referenced through embedded web page links will be retrieved from the same server or from another one

Http) Table	Value	-
HTTP Specification	HTTP 1.1	
Page Interarrival Time (seconds)	exponential (360)	
Page Properties	()	
Server Selection	()	
RSVP Parameters	None	
Type of Service	Best Effort (0)	
Details Promote	OK Cancel	*

(Server Selection) T	able		×
Attribute	Value		A
Initial Repeat Probability	Browse		
Pages Per Server	exponential (12)		
			Ŧ

- Initial Repeat Probability probability that a user would request the next page from the same server
 - 0.0 None
 - 0.6 Browse
 - 0.9 Research
 - 0.3 Search
- Pages Per Server if the same server is chosen, then the client retrieves *N* consecutive web pages from that server
 - Otherwise, a new server is selected

(Server Selection) T	able	×
Attribute	Value	<u>^</u>
Initial Repeat Probability	Browse	
Pages Per Server	None	
	Browse Research Search Edit	
Details Prom	note	OK Cancel

• **Print** – models the operation of submitting a printing job to a printer

Attri	bute	Value 🔺
1	Number of Rows	1
8	Enter Application Name	
0	- Name	Enter Application Name
	Description	()
0	- Custom	Off
1	- Database	Off
0	- Email	Off
0	- Ftp	Off
0 0 0 0 0 0 0 0 0 0 0	- Http	Off
0	- Print	Off
0	- Peer-to-peer File Sharing	Off
1	- Remote Login	Text File
0	 Video Conferencing 	B/W Images Color Prints
0	 Video Streaming 	Edit
?	. Voice	Off
E N	IOS	_
Match: C Exa	Look in: ct V Names string V Values	Coursertation Efter Ø Advance Ø Advance

• Submitting a printing job

- A file from the client
- A 8-byte close confirmation message from the printer
- Each printing job creates a new transport connection with the printer
- The default transport protocol = **TCP**

• Text File vs. B/W Images vs. Color Prints

• The main difference is the size of transferred files and the frequency of printing job requests

🚺 (Print) Table			[] (Print) Table		•	[] (Print) Table		•
Attribute	Value	<u>^</u>	Attribute	Value	^	Attribute	Value	<u>^</u>
Print Interarrival Time (seconds) exponential (90)		Print Interarrival Time (secon	ds) exponential (180)		Print Interarrival Time (seconds) exponential (360)	
File Size (bytes)	normal (3000, 90000)		File Size (bytes)	nomal (10000, 1000000)		File Size (bytes)	nomal (30000, 9000000)	
Symbolic Printer Name	Printer		Symbolic Printer Name	Printer		Symbolic Printer Name	Printer	
Type of Service	Best Effort (0)		Type of Service	Best Effort (0)		Type of Service	Best Effort (0)	
Details Promote	QK Ça		DetailsPromote	QK		Retails Promote	<u>Ö</u> K <u>Č</u>	

• **Peer-to-peer File Sharing** – models a client-to-client protocol without the concept of a server

Attrib	oute	Value			
2	Number of Rows	1			
6	Enter Application Name				
?	- Name	Enter Application Name			
?	Description	()			
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	- Custom	Off			
0	- Database	Off			
0	- Email	Off			
?	- Rp	Off			
3	- Http	Off Off Off			
3	- Print				
0	- Peer-to-peer File Sharing				
2	- Remote Login	Off			
0	 Video Conferencing 	Low Traffic High Traffic			
	 Video Streaming 	Edit			
3	L. Voice	Off			
ΞM	os	-			
Extende	d Attrs. Model Details Object Do	cumentation			
⑦ Match:	Look in:	<u>Filter</u>			
C Exac	t 🔽 Names	Advance			
Subs	string 🔽 Values Ex 🔽 Possible values	Apply to selected objects			

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• P2P file sharing

- A 512-byte request from peer 1 to peer 2
- 2 Part 1 of the requested file downloaded from peer 2
- 3 A 8-byte close confirmation message from peer 2
- A 512-byte request from peer 1 to peer 3
- S Part 2 of the requested file downloaded from peer 3
- A 8-byte close confirmation message from peer 3
 - 🧿 etc.
- P2P file sharing differs from HTTP and FTP in that a peer may request a portion of a file from multiple nodes rather than just one
 - Simultaneous requests for portions of a file are supported
 - Trackers are not modeled
- The default transport protocol = TCP

• Low Traffic vs. High Traffic

• The main difference is the size of transferred files and the frequency of transactions

nter-Request Time (minutes	exponential (120)		
Requested File Size (bytes)	uniform_int (10000, 100000)		
File Popularity	uniform_int (1, 5)		
eecher Probability	0.0 None Best Effort (0)		
RSVP Parameters			
Type of Service			

File Popularity uniform_int (1,5) Leecher Probability 0.0 RSVP Parameters None	Attribute	Value		
File Popularity uniform_int (1,5) Leecher Probability 0.0 RSVP Parameters None	Inter-Request Time (minutes)	exponential (30)		
Leecher Probability 0.0 RSVP Parameters None	Requested File Size (bytes)	uniform_int (100000, 10000000)		
RSVP Parameters None	File Popularity	uniform_int (1,5)		
	Leecher Probability	0.0		
	RSVP Parameters	None		
Type of Service Best Effort (0)	Type of Service	Best Effort (0)		
	nut I nut			
	Details Promote	<u>QK</u> <u>C</u> ancel		

- File Popularity number of peers that have the requested file
- Leecher Probability probability that a node that runs the Peer-to-peer File Sharing application will be a leecher
 - Leecher a node that only downloads files from other peers and doesn't contribute any files to the P2P system

None
None
None
0.0
None
Best Effort (0)

 Remote Login – models a terminal service (aka Terminal Network or Telnet)

Attribute	Value 🔺		
Number of Rows	1		
Enter Application Name			
Name	Enter Application Name		
Description	()		
Custom	Off		
Database	Off		
Image: Bescription - Custom Image: Outbody	Off		
Ptp	Off		
P Http	Off Off Off Off		
Print			
Peer-to-peer File Sharing			
Remote Login			
Video Conferencing	Off Low Load		
Video Streaming	Medium Load		
Voice	High Load		
MOS	Edit 👻		
extended Attrs. Model Details Object Do	Elter		

• Remote login scenario

- A command issued from the local terminal
- 2 A copy of the command is sent back
- A response generated by the remote host
- All commands and responses are transmitted over a single transport connection
- The default transport protocol = **TCP**

- Low Load vs. Medium Load vs. High Load
 - The main difference is the size and the frequency of transactions
- Terminal Traffic (bytes/command) amount of data transferred per command
- Host Traffic (bytes/command) amount of data returned in response to a command

🚺 (Remote Login) Table		×	11	🚺 (Remote Login) Table		•	I	🚺 (Remote Login) Table		— ×-
Attribute	Value		47	Attribute	Value	<u>^</u>		Attribute	Value	<u>^</u>
Inter-Command Time (seconds)	nomal (120, 10)		417	Inter-Command Time (seconds)	nomal (60, 5)			Inter-Command Time (seconds)	nomal (30, 5)	
Terminal Traffic (bytes per command)	/ normal (10, 4)		47	Terminal Traffic (bytes per command)	nomal (20, 16)			Terminal Traffic (bytes per command)	normal (60, 144)	
Host Traffic (bytes per command)	normal (5, 2.778)		47	Host Traffic (bytes per command)	nomal (10, 11.111)			Host Traffic (bytes per command)	normal (25, 25)	
Symbolic Server Name	Remote Login Server		47	Symbolic Server Name	Remote Login Server			Symbolic Server Name	Remote Login Server	
Type of Service	Best Effort (0)	1	417	Type of Service	Best Effort (0)			Type of Service	Best Effort (0)	
RSVP Parameters	None	1	417	RSVP Parameters	None			RSVP Parameters	None	
Back-End Custom Application	Not Used	1	417	Back-End Custom Application	Not Used			Back-End Custom Application	Not Used	
Details Promote	<u>Q</u> K Can			Details Promote	<u> </u>	 <u>C</u> ancel		Details Promote	<u>O</u> K C	 Cancel

• Video Conferencing – models transmission of video traffic between 2 nodes in the network

Attri	bute	Value 🔺			
2	Number of Rows	1			
6	B Enter Application Name				
?	- Name	Enter Application Name			
3	Description	()			
3	- Custom	Off			
9 9 9 9 9 9 9 9 9 9 9 9 9	- Database	Off Off			
2	- Email				
?	- Ptp	Off			
?	- Http	Off Off			
3	- Print				
3	- Peer-to-peer File Sharing	Off			
3	- Remote Login				
3	 Video Conferencing 	Off Off Low Resolution Video			
3	 Video Streaming 				
3	- Voice	High Resolution Video VCR Quality Video			
ΞŅ	IOS				
<u> </u>		Edit			
Extende	ed Attrs. Model Details Object Do	ocumentation			
⑦ [Ch 1			
~ .		Eilter			
Match: C Exa	Look in: ct 🔽 Names				
	string 🔽 Values	Advanced			

• Video conference

- A 8-byte request from the local host
- A 64-byte response from the remote host
- 3 A one-way video stream in each direction
- Typically, a Video Conferencing session is established between 2 clients without the use of a server
- The default transport protocol = UDP
 - If TCP is used as the transport protocol, each host opens an independent TCP connection

- Low Resolution vs. High Resolution vs. VCR Quality Video
 - The main difference is the size of the video frames and frequency of their generation

ſ	🚺 (Video Conferencing) Table			[] (Video Conferencing) Table		—	[] (Video Conferencing) Table	E	3
	Attribute	Value	^	Attribute	Value	^	Attribute	Value	^
	Frame Interarrival Time Information	10 frames/sec		Frame Interarrival Time Information	15 frames/sec		Frame Interarrival Time Information	30 frames/sec	
	Frame Size Information (bytes)	128X120 pixels		Frame Size Information (bytes)	128X240 pixels		Frame Size Information (bytes)	352X240 pixels	
	Symbolic Destination Name	Video Destination		Symbolic Destination Name	Video Destination		Symbolic Destination Name	Video Destination	
	Type of Service	Best Effort (0)		Type of Service	Best Effort (0)		Type of Service	Best Effort (0)	
	RSVP Parameters	None		RSVP Parameters	None		RSVP Parameters	None	
	Traffic Mix (%)	All Discrete		Traffic Mix (%)	All Discrete		Traffic Mix (%)	All Discrete	
			~			~			-
	Details Promote	<u>QK</u> <u>C</u> an	cel	Details Promote	<u>Q</u> K <u>C</u> an	cel	Details Promote	QK Cancel	

- Frame Size Information (bytes) size of incoming (generated at the remote host) and outgoing (generated at the local host) frames
 - Each pixel requires 9 bits
- Traffic Mix (%) whether the traffic is generated as pure discrete (explicit) or pure background or part discrete/part background
 - 0 All Discrete
 - 100 All Background

Attribute	Value			
Frame Interarrival Time Information	15 frames/sec			
Frame Size Information (bytes)	128X240 pixels			
Symbolic Destination Name	Zero			
Type of Service	128X120 pixels			
RSVP Parameters	128X240 pixels 352X240 pixels			
Traffic Mix (%)	Edit			

🚺 (Frame Size Information) Tabl	e 💌
Attribute	Value
Incoming Stream Frame Size (bytes)	constant (34560)
Outgoing Stream Frame Size (bytes)	constant (34560)
	-
Details Promote	<u>O</u> K <u>C</u> ancel

• Video Streaming – you can capture the video traffic produced by a given video streaming application into a file, and then use this file to simulate the same traffic in a scenario

Attribute	Value		<u> </u>	
Video File Name	video_streaming_pk	t_info		
Symbolic Server Name	Video Streaming Ser	ver		
Type of Service	Best Effort (0)			
RSVP Parameters	None			
			-1	
Details Pr	omote	<u>O</u> K	Cancel	
Remote l	ogin	Off		
· Video Co		Off		
- Video Str		()		
Voice		Off		
N		1.000		
■ MOS ptended Attrs. Mode	I Details Object Do	cumentation		
ptended Attrs. Mode	I Details Object Do	cumentation		
N	I Details Object Do			

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Video streaming

- A 8-byte request from the client to the server
- A one-way video stream from the server
- 3 A 1-byte close message from the server
- 4 1-byte close confirmation message from the client
- A video capture file is shipped with Riverbed Modeler
 - C:/Riverbed EDU/17.5.A/models/std/example_networks/ Application_Configuration_Example.project/video_streaming.gdf
 - The first row specifies the size of the packets
 - The remaining rows specify the packet interarrival times in microseconds
- The default transport protocol = UDP

• Voice – models network communication between 2 clients using a digitized voice signal

Attri	bute	Value 🔺		
1	Number of Rows	1		
	Enter Application Name			
0	Name	Enter Application Name		
õ	Description	()		
õ	- Custom	Off		
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- Database	Off		
٢	- Email	Off		
2	- Rp	Off		
2	- Http	Off		
2	- Print	Off		
2	- Peerto-peer File Sharing	Off Off		
2	- Remote Login			
2	 Video Conferencing 	Off		
2	- Video Streaming	Off		
?	Voice	Off		
E	MOS	Off		
Extende (2) [Match: (2) Exa (3) Sub (2) Reg	ct vector Names string vector Values	PCM Quality Speech PCM Quality and Sience Suppressed Low Quality Asserts Low Quality Asserts Low Quality Asserts Difference Suppressed Site Quality Speech CSM Quality and Sience Suppressed Edit. Dyrug vocconsection CK Cancel		

- Typically, the total time it takes for the voice signal to travel from one caller to another (aka mouth-to-ear delay) consists of the time it takes to:
 - Encode and compress the voice data on one end
 - Packetize the encoded and compressed voice data
 - Transmit the voice data packet through the network
 - Decompress the received voice data
 - Decode it for playback at the other end
- A voice call is established from one client to another, no server is modeled for voice conversations
- The default transport protocol = UDP

- The main difference is the type of voice encoding scheme and the ToS
- PCM Quality Speech vs. Low-Quality Speech

Attribute	Value _
Silence Length (seconds)	default
Talk Spurt Length (seconds)	default
Symbolic Destination Name	Voice Destination
Encoder Scheme	G.711
Voice Frames per Packet	1
Type of Service	Interactive Voice (6)
RSVP Parameters	None
Traffic Mix (%)	Al Discrete
e	

Attribute	Value	
Silence Length (seconds)	default	
Talk Spurt Length (seconds)	default	
Symbolic Destination Name	Voice Destination	
Encoder Scheme	G.723.1 5.3K	
Voice Frames per Packet	1	
Type of Service	Interactive Voice (6)	
RSVP Parameters	None	
Traffic Mix (%)	All Discrete	
~ ·	in the second	

• IP Telephony vs. GSM Quality Speech

Attribute	Value
Silence Length (seconds)	default
Talk Spurt Length (seconds) default
Symbolic Destination Name	Voice Destination
Encoder Scheme	G.729 A
Voice Frames per Packet	1
Type of Service	Best Effort (0)
RSVP Parameters	None
Traffic Mix (%)	All Discrete
o .	

Attribute	Value _	
Silence Length (seconds)	default	
Talk Spurt Length (seconds)	default	
Symbolic Destination Name	Voice Destination	
Encoder Scheme	GSM FR	
Voice Frames per Packet	1	
Type of Service	Best Effort (0)	
RSVP Parameters	None	
Traffic Mix (%)	Al Discrete	

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- The voice data arrives in spurts that are followed by a silence period
- PCM... and Silence Suppressed vs Low... and Silence Suppressed

G.711 (slence)	
p20	

Attribute	Value
Silence Length (seconds)	default
Talk Spurt Length (seconds) default
Symbolic Destination Name	Voice Destination
Encoder Scheme	G.723.1 5.3K (silence)
Voice Frames per Packet	1
Type of Service	Interactive Voice (6)
RSVP Parameters	None
Traffic Mix (%)	All Discrete

• IP... and Silence Suppressed vs GSM... and Silence Suppressed

Attribute	Value	
Silence Length (seconds)	default	
Talk Spurt Length (seconds)	default	
Symbolic Destination Name	Voice Destination	
Encoder Scheme	G.729 A (slence)	
Voice Frames per Packet	1	
Type of Service	Best Effort (0)	
RSVP Parameters	None	
Traffic Mix (%)	All Discrete	

Attribute	Value	
Silence Length (seconds)	default	
Talk Spurt Length (seconds)	default	
Symbolic Destination Name	Voice Destination	
Encoder Scheme	GSM FR (allence)	
Voice Frames per Packet	1	
Type of Service	Best Effort (0)	
RSVP Parameters	None	
Traffic Mix (%)	Al Discrete	
· ·		

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- Silence Length (seconds) time spent by the called party (incoming) and the calling party (outgoing) in silence mode in a speech-silence cycle
 - The incoming and the outgoing periods of silence are independent of each other
 - I.e., it is possible for both clients to talk or to be silent simultaneously, or for one side of the call to talk while the other side is silent

Attribute	Value 🔺	
Silence Length (seconds)	default	
Talk Spurt Length (seconds)	default	
Symbolic Destination Name	None	
Encoder Scheme	Edit Gowrnn (silence)	
Voice Frames per Packet	1	
Type of Service	Best Effort (0)	
RSVP Parameters	None	
Traffic Mix (%)	All Discrete	
e 1	NI	

🚺 (Silence Length) Table	×
Attribute	Value
Incoming Silence Length (seconds)	exponential (0.65)
Outgoing Silence Length (seconds)	exponential (0.65)
	-
Details Promote	<u>Q</u> K <u>C</u> ancel

- Talk Spurt Length (seconds) time spent by the called party (incoming) and the calling party (outgoing) in speech mode in a speech-silence cycle
 - The incoming and the outgoing periods of talk spurts are independent of each other
 - I.e., it is possible for both clients to talk or to be silent simultaneously, or for one side of the call to talk while the other side is silent

Attribute	Value 🔺	
Silence Length (seconds)	default	
Talk Spurt Length (seconds)	default	
Symbolic Destination Name	default	
Encoder Scheme	None	
Voice Frames per Packet	Edit	
Type of Service	Best Effort (0)	
RSVP Parameters	None	
Traffic Mix (%)	All Discrete	
e 1	NI	

🚺 (Talk Spurt Length) Table	×
Attribute	Value
Incoming Talk Spurt Length (seconds)	exponential (0.352)
Outgoing Talk Spurt Length (seconds)	exponential (0.352)
	-
Details Promote	<u>O</u> K <u>C</u> ancel

• Encoder Scheme – algorithm for encoding voice into a digital signal to be used by the calling and called parties

Attribute	Value		
Silence Length (seconds)	default		
Talk Spurt Length (seconds)	default		
Symbolic Destination Name	Voice Destination		
Encoder Scheme	GSM FR (silence)		
Voice Frames per Packet	G.711		
Type of Service	G.711 (silence)	_	
RSVP Parameters	G.729 A G.729 A (silence)		
Traffic Mix (%)	G.723.1 5.3K	_	
	G.723.1 5.3K (silence)		

Encoder Sch	ieniej rabie	23
Attribute	Value	<u>^</u>
Incoming encode	r scheme GSM FR (silence)	
Outgoing encode	r scheme GSM FR (silence)	
	G.711 G.711 (slence) G.711 App.I G.711 App.I (slence) G.723.1 5.3K (slence) G.723.1 5.3K (slence) G.723.1 6.3K (slence) G.723.1 6.3K (slence)	▲ ▼
Details	Promote GSM FR (silence)	
	GSM EFR GSM EFR (silence) GSM HR GSM HR (silence) G.726 16K	F
	G.726 16K (silence) G.726 24K G.726 24K (silence) G.726 32K G.726 32K (silence)	
	G.726 40K G.726 40K (silence) G.728 12.8K G.728 12.8K (silence) G.728 12.8K (silence) G.728 16K	T

- Signaling method for establishing and tearing down a voice call
- **Protocol** signaling protocol for setting up and releasing the voice connection
 - None no signaling and the calls will start and end without any setup/release procedures
 - SIP will be used for signaling
 - H.323 will be used for signaling

Voice Frames per Packet 1 Type of Service Best Effort (0)			Attribute	
Type of Service Best Effort (0) RSVP Parameters None Traffic Mix (%) All Discrete				
RSVP Parameters None Traffic Mix (%) All Discrete		1		
Traffic Mix (%) All Discrete		Best Effort (0)	Type of Service	
		None	RSVP Parameters	
Signaling ()		All Discrete	Traffic Mix (%)	
		()	Signaling	
Compression Delay (seconds) ()		()	Compression Delay (seconds)	
Decompression Delay (seconds) None			Decompression Delay (seconds)	
Conversation Environment H 323	-		Conversation Environment	

(Signaling)	Table [83
Attribute	Value	
Protocol	None	ī
Traffic Modeling	None	
	SIP H.323	
		-
<u>D</u> etails	Promote OK Cance	

- Traffic Modeling what portion of the voice traffic will be modeled
 - Control Plane flow of packets associated with the signaling protocol
 - Traffic Plane flow of packets associated with the application data
- If 'Control Plane Only' is selected, no application traffic will be simulated from the time the call is setup to the time it is released

Voice Frames per Packet	1
	Best Effort (0)
RSVP Parameters	None
Traffic Mix (%)	All Discrete
Signaling	()
Compression Delay (seconds)	()
Decompression Delay (seconds)	None
Conversation Environment	SIP H 323

🚺 (Signalin	g) Table	23
Attribute	Value	
Protocol	None	
Traffic Model	ing Control & Traffic Plane	
	Control & Traffic Plane Control Plane Only	
		-
<u>D</u> etails	Promote	<u>O</u> K <u>C</u> ancel

- Conversation Environment incoming and outgoing conversation environments for the purpose of Mean Opinion Score (MOS) estimation
 - Land phone Quiet room
 - Land phone Noisy room
 - Cell phone in building
 - Cell phone in SUV (Sport Utility Vehicle) or sedan
 - Cell phone in convertible

Attribute	Value
	Gom In Janonooy
Voice Frames per Packet	1
Type of Service	Best Effort (0)
RSVP Parameters	None
Traffic Mix (%)	All Discrete
Signaling	None
Compression Delay (seconds)	0.02
Decompression Delay (seconds)	0.02
Conversation Environment	() · · · · · · · · · · · · · · · · · ·

ľ	(Conversation Environn	nent) Table	×
Γ	Incoming Conversation Environment	Outgoing Conversation Environment	<u> </u>
0	Land phone - Quiet room	Land phone - Guiet room	~
1	Rows Delete		ncel

- ITU-T G.107 'The E-model: a computational model for use in transmission planning'
- R = Ro Is Id Ie + A, $0 \leq R \leq 100$
- Ro basic signal-to-noise ratio (SNR)
- Is sum of all impairments due to voice transmission
- Id impairment due to the delay
- Ie impairment due to packet loss
- www.itu.int/ITU-T/studygroups/com12/emodelv1/index.htm

	Attribute	Value
3	- name	node_0
٢	Application Definitions	None
	MOS	
3	MOS Advantage Factors	Default
3	Voice Conversation Environments	All Environments
T)	Voice Encoder Schemes	Land phone - Quiet room Land phone - Noisy room Cell phone in building Cell phone in SUV or sedan Cell phone in convetible AL Environmenta Edt

Name	Communication System	R0	ls	ld	le	Playout Delay	
Land phone - Quiet room	Conventional Wirebound	94.77	1.43	()	()	()	
Land phone - Noisy room	Conventional Wirebound	90.74	5.67	()	()	()	
Cell phone in building	Cellular Mobility in a Building	85.91	2.32	()	()	()	
Cell phone in SUV or sedar	Mobility across geographical area	80.73	3.24	()	()	()	
Cell phone in convertible	Mobility across geographical area	70.32	4.87	()	()	()	

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• Voice Encoder Schemes – voice encoding schemes are defined through attributes such as codec type, frame size, etc.

Attribute	Value
2 name	node 0
 Application Definitions 	None
MOS	110110
P Voice Encoder Schemes	(L)
Number of Rows	46
I PCM	
PCM	
PCM	
PCM	
ACELP	
ACELP	
MP-MLQ	
MP-MLQ	
RPE-LTP	
RPE-LTP	
ACELP	
ACELP	
VSELP	
VSELP	
ADPCM	
ADPCM	· · · · · · · · · · · · · · · · · · ·
0	Advanced

	Codec Type	Name	Frame Size (secs)	Lookahead Size (secs)	DSP Processing Ratio	Coding Rate (bits/sec)	Speech Activity Detection	Equipment Impairment Factor (Ie)	Pa_ Lo Rc_ Fa
PCM	PCM	G.711	10 msec	0 msec	1.0	64 Kbps	Disabled	0	4.3
PCM	PCM	G.711 (slience)	10 msec	0 msec	1.0	64 Kbps	Enabled	unknown	def
PCM	PCM	G.711 App.I	10 msec	0 msec	1.0	64 Kbps	Disabled	0	25
PCM	PCM	G.711 App.I (silence)	10 msec	0 msec	1.0	64 Kbps	Enabled	unknown	def
ACELP	ACELP	G.723.1 5.3K	30 msec	7.5 msec	1.0	5.3 Kbps	Disabled	19	def
ACELP	ACELP	G.723.1 5.3K (silence)	30 msec	7.5 msec	1.0	5.3 Kbps	Enabled	unknown	del
MP-MLQ	MP-MLQ	G.723.1 6.3K	30 msec	7.5 msec	1.0	6.3 Kbps	Disabled	15	def
MP-MLQ	MP-MLQ	G.723.1 6.3K (silence)	30 msec	7.5 msec	1.0	6.3 Kbps	Enabled	15	16
6 F	Rows	Joseft Joseft	D	plicate	Move Up	Mgve	Down		