

Test Video Streaming using DASH Server and InterOp APK

Goal: Host DASH server on LANforge and test Video Streaming using InterOp apk.

This cookbook requires LANforge GUI version 5.4.6 and above.

Background

DASH is used for embedding videos in a web page without using third party services such as youtube or vimeo. It is mostly used in OTT platforms.

Dynamic Adaptive Streaming over HTTPS (DASH) is a variant of Dynamic Adaptive Streaming (DAS) that uses the HTTPS protocol for delivering video content over the internet. HTTPS is the secure version of HTTP, and it provides encryption and authentication to protect the privacy and integrity of the data being transmitted.

With DASH, the video content is encoded at multiple bitrates and is divided into small segments that can be downloaded and played back in a continuous stream. These segments are delivered over the internet using HTTPS, which provides secure and reliable delivery of the video content.

Android App has inbuilt Video Media Player (Exoplayer) which can run various types of Media Types which includes:

- · Progressive
- · DASH (Dynamic Adaptive Streaming over HTTPS)
- HTTP Live Streaming
- · Real Time Streaming Protocol

Diagram of Setup



- 1. Connect Android Phone to LANforge via USB such that the device will appear in Interop Tab.
 - Note: Make sure to enable developer settings in android phones.

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2. Select the device in Interop Tab and click on Batch Modify tab.

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3. Select Launch GUI option to view the mobile screen.

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4. Click Install to install Interop apk onto the mobile phone.

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5. Enter LANforge Manager IP, SSID, Encryption and Password. Then, click *Apply* and start options such that device will be connected to Wi-Fi and enter testroom. Here, mobile got clustered to the LANforge with Resource-Id 10.

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6. After entering the Test room, device must appear in Port Manager Tab. That is the Wi-Fi port of Mobile.

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7. To run nginx on eth1 port enable http on eth1 interface by double-clicking on the port and apply the settings.

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easeOutation 210	10110 10110	9 192.1	8,200,160	0 end	.000	C secondaria	Der Bare	Desr P Balance	Dell' P Mender IDr.	None	· 0.1001+0	2 anno
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Dellular Congested	1.020.1	· 0000		itte 0	wiphut	Seromus	DHCP-3Pv4	Secondary-IPs	DHCP Client ID:	None	Q 186-00	N. (2004-40)
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	1,211,3	00.01	4.35.76	0 400	wyryo	Serenaires	is you fee		Group prvs.	puro	Contraption (9040
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	1.306.1	0.001		0 wiph	y0	Settinge into	Gateway IP:	0000	3Pv6 QW2	AUTO	L tenepotane	ab6-PD
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	1,317.1	0.0.0.0	0.000.00	0 wiph	y0	-	MAC ADD:	00.60+07/88.20	TXQLes	1000	C enclused	Officed
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	300di	ents ocao				Tour You ma	y have to manually	disable the standard I	httpd service in your	05 to avoid address bi	nding conflicts.	CRO Enabled
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	Band,	streering				10	-		4	200		

8. To host DASH server on LANforge use the following commands.

1. sudo dnf install ffmpeg

FFmpeg is a popular multimedia framework that can be used to record, convert, and stream audio and video files.

🛅 🔛 LANforge Manager Ve 🚲 (Will Capacity Te	est] 💮 Wifi Capacity Test	Lis Chamber View (5.4.6) 📓 Mate Terminal
0		Mate Terminal 💿 💿 🖲
File Edit View Search Terminal Help		
[Isofo] password for lanforge: Last metadata expiration check: 2:46:18 ago on Dependencies resolved.	Thu 16 Mar 2023 06:21:00 AM POT.	
Package Arch Version I	Repository Size	
Installing: ffmpeg x86_64 4.1.5-1.fc30	rpmfusion-free-updates 1.3 M	
Transaction Summary		
Install 1 Package		
Total download size: 1.3 M Installed size: 1.8 M Is this ok (y/W): y Downloading Packages: ffmpeg-4.1.5-1.fc30.x86_64.rpm	67 k8/s 1.3 M8 00:20	
Tetal Running transaction check Transaction check succeeded. Running transaction test Transaction test succeeded. Running transaction	64 k8/s 1.3 M8 00:21	
Preparing : ffmpeg-4.1.5-1.fc30.x86 6 Running scriptlet: ffmpeg-4.1.5-1.fc30.x86 6 Verifying : ffmpeg-4.1.5-1.fc30.x86 6	1/1 4 1/1 4 1/1 4 1/1	
Installed: ffmpeg-4.1.5-1.fc30.x86_64		
Complete! [lanforge@ct523c-c3d8 ~]\$ []		

2. sudo dnf install https://download1.rpmfusion.org/free/fedora/rpmfusionfree-release-\$(rpm -E %fedora).noarch.rpm

```
https://download1.rpmfusion.org/nonfree/fedora/rpmfusion-nonfree-release-
$(rpm -E %fedora).noarch.rpm
```

This command installs the RPM Fusion repositories on a Fedora system. RPM Fusion is a repository of software packages that are not included in the default Fedora repositories, such as multimedia codecs and drivers.



3. sudo dnf install gpac

GPAC is an open-source multimedia framework that can be used to create, package, and stream multimedia content. This command, when run, downloads and installs the GPAC package and its dependencies on your system. After the installation is complete, use the GPAC tools to create and manipulate multimedia content.

Le LAMorge Manager Ve (a) [WiFi Capacity Test] Ele Edit View Search Terminal Help	de WiFi Capacity Test	🔬 Chamber View (5.4.6) 🛛 🕅 Mate Terminal	Mate Terminal			
1lanforpeRt528c-c100 -15 tudo dmf install opac PMf Fusion for Rodora 30 - Nonfree - Updates PMf Fusion for Rodora 30 - Nonfree Last metadate explration checks 0:00:01 ago on Th Dependencies resolved.	u 16 Mar 2023 09:10:56 AM POT				25 k8/s 88 k8 33 k8/s 227 k8	00:03 00:06
Package	Architecture	Version		Repository		Size
Installing: goac Installing dependencies: ggac-libs openjpeg-libs	x86_64 x86_64 x86_64	0.7.1-10.7c30 0.7.1-10.fc30 1.5.1-23.fc30		rpsfusion-free rpsfusion-free fedora		450 k 1.9 M 82 k
Transaction Summary						
Install 3 Packages						
Yotal: download size: 2.4 M Installed size: 7.5 M Is this & (yM): p Downloading Tackape: 1/31: open-jop: lbs: 1.5, 1.23, fcb0.x86 64, rps 1/31: open-jop: lbs: 1.6, 1.68, x86 64, rps 1/31: open-lbs: 0.7, 1.48, fcb0.x86 64, rps	k				75 k8/s 82 k8 189 k8/s 450 k8 204 k8/s 1.9 M8	00:01 00:02 00:02
Total Running transaction check Munning transaction totek Running transaction totek Running transaction Preparing Installing Despired totek Running scriptet: Dok-0, 7:10, 100 d4 Running scriptet: Dok-0, 7:10, 100 d4 Verifying I goat-0, 7:10, 100 d4 Verifying I goat-0, 7:10, 100 d4 Verifying I goat-0, 7:10, 100, 40 Verifying I goat-0, 7	x86_64 54 586_64 64				591 k8/s 2.4 M8	00:04 1/1 1/3 2/3 3/3 3/3 1/3 2/3 3/3
Installed: gsac-0.7.1-10.fc30.x88_64 Complete1 [lanforgedct523c-c368 -]5 []	gpac-118s-0.7.1	-10.fc30.x86_64	openjpeg-li	bs-1.5.1-23.fc30.x86_64		

- 9. Place below mentioned wifivideo.mp4 and convert.bash file in the html directory: /usr/local/lanforge/nginx/html/
 - 1. convert.bash
 - 2. wifivideo.mp4
- 10. Run the convert.bash to convert .mp4 to .mpd file using the command:

sudo bash convert.bash wifivideo.mp4

🕜 Applications Places System 🗟 🔤 🍪 😋 🎇 📕	Thu Mar 16, 11:33:42
🐻 ! 🖪 MATE Terminal 🔢 LANforge Manager 🗖 SM-A750F (as super	
O MATE Terminal	\odot \otimes \otimes
File Edit View Search Terminal Help	
[lanforge@ct523c-881f ~]\$ cd /usr/local/lanforge/nginx/html/	2
[lanforge@ct523c-881f html]\$ ls	
10m.bin 1m.bin 2m.bin 3m.bin 500k. <u>bin 50x.html convert.bash gpac</u> index.html reddit.html sample simple sintel_vod.mpd test tst wifivideo.mp4	
[lanforge@ct523c-881f html] 🕤 udo bash convert.bash wifivideo.mp4	
Converting "WiThVideo" to multi-bitrate video in MPEG-DASH	
<pre>trimpeg version 5.0.2 Copyright (C) 2000-2022 the FFmpeg developers built with occ 11 (CCC)</pre>	
unit with get 12 (Get) configuration:	ndir=/usr/share/manarch=x86_64a
this is a concerning of the second se	IONS -specs=/usr/lib/rpm/redbat/redba
t-hardened-cc1 -fstack-protector-strong -specs=/usr/lib/rpm/redhat/redhat-annobin-cc1 -m64 -mtune=generic -fasynchronous-unwind-tables -fstack-clash-protection -	fcf-protection'extra-ldflags='-Wl,
-z,relro -Wl,as-needed -Wl,-z,now -specs=/usr/lib/rpm/redhat/redhat-hardened-ld -specs=/usr/lib/rpm/redhat/redhat-annobin-cc1 -Wl,build-id=sha1 'extra-cf1	ags=' -I/usr/include/rav1e'enable-
libopencore-amrnbenable-libopencore-amrwbenable-libvo-amrwbencenable-version3enable-bzlibenable-chromaprintdisable-crystalhdenable-fontconfig	enable-frei0renable-gcrypte
nable-gnutlsenable-ladspaenable-libdaomenable-libdav1denable-libbsenable-libblurayenable-libbs2benable-libcdioenable-libdrmenable-libj	ackenable-libfreetypeenable-lib
fribidienable-libgsmenable-libilbcenable-libmp3lameenable-libmysofaenable-nvenc 💦 -enable-openalenable-openclenable-openglenable-libopenjp	<pre>egenable-libopenmptenable-libop</pre>
usenable-libpulseenable-librsvgenable-librubberbandenable-libsmbclientenable-version3enable-libsnappyenable-libsoxrenab	e-libspeexenable-libsrtenable-
HIDSSHenable-libsvtav1enable-libtworaenable-libtwolameenable-libvorbsenable-libv1d2enable-libv1dstabenable-libtwaatenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvabaenable-libvaba	ble-vapoursynthenable-libvpxena
Die-Vulkanenable-lingislangenable-linwebpenable-linxxd4enable-linxxd5enable-linxxl12enable-linzing	avoienable-iv2enable-avtilter -
-enante-inmouping -enante-postpic -enante-prineausuisante-startenante-share -enante-gpiuisante-deunguisante-strippingshirouis-/usi/inou+uisante-strippingshirouis-/usi/inou+	
libautil 57. 17.100 / 57. 17.100	
libavcodec 59. 18.100 / 59. 18.100	
libavformat 59. 16.100 / 59. 16.100	
libavdevice 59. 4.100 / 59. 4.100	
libavfilter 8. 24.100 / 8. 24.100	
libswscale 6. 4.100 / 6. 4.100	
libswresample 4. 3.100 / 4. 3.100	
lippostproc 56. 3.100 / 56. 3.100	
input #0, m0,mp4,m4a,3gp,3g2,mj2, irom willvideo.mp4 . Matadata	
major brand : mo42	
minor version : 0	
compatible_brands: isommp42	
encoder : Google	
Duration: 00:03:12.26, start: 0.000000, bitrate: 318 kb/s	
Stream #0:0[0x1](und): Video: h264 (Main) (avc1 / 0x31637661), yuv420p(tv, bt709, progressive), 640x360 [SAR 1:1 DAR 16:9], 219 kb/s, 25 fps, 25 tbr, 12800 tbn	(default)
Metadata:	
nandier_name : ISO Media Tile produced by Google Inc.	
Verido1_10 : [0][0][0][0][0] Straam # 0:160:21(und): Audio: app.(11) (moda / 0:6124706D) : A1100 Hz, starao fito 05 kh/s (dafault)	
Metadata:	
handler name : ISO Media file produced by Google Inc.	
	· · · · · · · · · · · · · · · · · · ·

11. A new directory will be created automatically to store the .mpd file. In the below picture, wifivideo.mpd is stored in *wifivideo* directory.

ð	Applications Places S	System 🖹 🔟 🍯 🌍 擆	/														Thu Mar 16, 11:40:04
	MATE Terminal	🛃 LANforge Manage	r 🗖 SN	/I-A750	as super												
	O SM-A750F	(as superuser) 🕙 🔿 🙁	0					LAN	lforge Man	ager Vers	ion(5.4.6)					\otimes \otimes	
	00:10 👂 🕫	4) (S. J. 🔒	Control R	Reporting	g Wind <u>o</u> ws <u>I</u> nfo	Test											
	≡ LANforge I	nterOp					Ch	amber <u>V</u> ier	N	Stop	All	Restart M	anager	R	efresh	HELP	
			Test Mgr	Reso	urce Mgr Interd	p [UT Profil	es Traff	ic-Profiles	Alerts W	arnings +	Wifi-Mes	sages				
	LIVE_DATA SYS_	INFO CHARTS VIDEOS	Status	s [Port Mgr	L	ayer-3	L3 En	dps	Layer 4-7	V	VanLinks	RF-Ge	enerator	Ge	neric	
	SPEED (1) 0 bps	s/0 bps	C	Disp: 19	2.168.200.223:1		Sniff Pac	kets	Down	1 Clea	r Counters	Reset	Port Dele	ete		_	
	IP	192.168.1.109	P	Rpt Time	r: medium (8 s)	-	Appl	/	VRF	1	Disp <u>l</u> ay	Cr <u>e</u> a	te Mo <u>d</u>	ify <u>B</u> a	tch Modify		
	SSID	"Band5"						All Ethe	rnet Interfac	es (Ports) for	all Resource	s					
	BSSID	90:3c:b3:b1:70:0d						0									
	Signal	-44 dBm	Port	Ø 1	IP	SEC	Alias	Dev	RX Bytes	RX Pkts	Pps RX	bps RX	TX Bytes	TX Pkts	Pps TX	bps T)	
	LinkSpeed	433 Mbps															
	Channel	5260 MHz	1.001.0		192.168.200.223	0	eth0		63,270,597	210,916	36	21.037	74,239,348	185,/38	31	127,2	
	CPU util	44.84 %	1.001.2		0.0.0.0	0	wiphy0		0	0	0	0	005,555	0,151	()	
	DNS1	192.168.1.1	1.001.3		0.0.0.0	0	wiphy1		0	0	0	0	0	0	(
	DNS2	0.0.0.0	1.001.4							MATE Term	inal			\odot	\odot \otimes	171	
	DHCP Server	192.168.1.1	1.010.1		0 File Felix Min		web Town	and Links)	
	Gateway	192.100.1.1 21600 Sec	1.010.2	1	O File Edit Viel	W 58	arch Term	inai Heip)	
	WIFI Concested	21000 SEC	1.011.0		1 Tanforge@ct	523C	-881T W1T	(html/wi	fividee/w	ifivideo	morge/ng:	LNX/NTM1/	W1T1V1deo/	witivideo	. mpa	35,2	
	Cellular Congested	NO	1.020.0		1 []anforge@ct	523c	.881f wif	ivideol	11VIGEO/W	111111060	. ilipu					3 26,4	
	contract congested		1.020.1	1	o											0	
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	III	0 <	01110	0													
			200 client	er_5G													
			Soociient	is.pcap													
	CONFIG	Rand Steering ps															
		bana steering.ps															
	Configure LANforge																
			Band_Str	eering													
															~		

12. Create a L4 Endpoint by clicking on *Layer 4-7* tab and opening the *Video Streaming* tab on app.

🛅 : 🕅 (MA)	TE Terminal]	🛃 LANforge Manager	SM-A750F (as su	per 🛃 Create/Mo	dify Laye			
0			LANforge Manager	Version(5.4.6)		۲	\odot \otimes	SM-A750F (as superuser) S A X
Control Bepo	rting Windows In	nfo Iests						00.48 (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
		Chamber	Yiew	Stop All Res	itart Manager	Refresh	HELP	■ LANforce InterOp
Test Mgr I	Resource Mgr Int	terop DUT Profiles T	Traffic-Profiles Alerts	Warnings + W	ifi-Messages		and a	
Status	Porting	Layers La	s criops Laye	R Wanter	NP-Gener	ator	rijeris.	LIVE_DATA SYS_INFO CHARTS VIDEO
R¢	xTimer: fast	(1 s) Go Test Man	nager all	Select All	Start + Stop - Quie	rsce Clear		SPEED (\$1) 194.85 Kbps/365.03 Kbps
Vi	ew 0-20000	-	Go	Display Crga	ate Moglify Batch M	Iodify Delete		
		Lay	yer 4-7 Endpoints for Sel	ected Test Manager-				
Name	0		Create/Modify	Layer 4-7 Endpoint		0.0	× M	
	Name:		Rpt Timer:	fast (1 s)	▼ Test Manager:	default_tm		
	Shelf:	1	Resource:	1 (ct523c-881f)	▼ Port	1 (eth1)	1	
	IP Addr:	AUTO	Endo ID:	0				
	URLs per 10mc	100	Max Speed:	Infinite	-			
	URL Timeout:	10000	DNS Cache Timeout	60	-			
	TFTP Block Size:	Default (512 B)	Quiesce:	3 (3 sec)	Quiesce After:	Infinite (0)		Video URL PLAY
	Praxy Port:	0	Proxy Server:		Praxy Auth:			
	Proxy Auth Types:	Basic Digest NTL	LM HTTP Compressio	on: 🗌 Gzip 📄 Deflate				
	HTTP Auth Types:	Basic Digest GSS	S-Negotiate 🔲 NTLM					
	SSL Cert:	ca-bundle.crt	SMTP-From:		Agent/RCPT-TO:			
	Media Source:	Dash(1)	 Media Quality: 	4k(0)	 Playbacks: 	1	*	
	Random Seeks:	0	 Minimum Duration: 	Duration (0 sec)	Maximum Duration:	Duration (0 sec)	-	
Looped in to: lo	UL/DL:	Download		IPv6			-	
01	URL							
Band_ste	Source/Dest File:						_	
c01	Get-URLs-From	m-File Authenticate Serv	ver Use-Proxy	Allow-Reuse	w-Cache 🕑 Enable 400	Show Header	·	
~	Bind DNS	FTP PASV FTP EPSV	Real Browser	ndeo stream Playt	Dacks Random Seeks	Random		
Configure	Destorge	Δρρίγ	QK	gatch-Create	Cancel			
		В	Band_Streering		ab la clicata de la co			
					thincient_drives			

13. Add the URL and Source/Dest File. Select Resource port number of your mobile, enable Real Browser, and Video Stream options. Add the eth1 IP address on which nginx server is enabled and enter the URL.

[MAT	'E Terminal]	🛃 LANforge Manager	SM-A750F (as su	per 🔬 Create/Modify	Laye 💹 MATE T	erminal		
0		L	ANforge Manager	Version(5.4.6)		\checkmark	•	SM-4750E (as superuser) ♥ ♠ ★
<u>Control</u> <u>Repor</u>	ting Windows In	fo <u>T</u> ests						00:56 (b) 18 41 % at 6
		Chamber V	iew	Stop All Restart	Manager	Refresh	HEL	E LANforge InterOp
Test Mgr R Status	esource Mgr Int Port Mor	erop DUT Profiles Tra	affic-Profiles Alerts	Warnings + Wifi-M	essages PE-Gener	rator Ger	peric	
510105							incrite.	LIVE_DATA SYS_INFO CHARTS VIDEO
Rpt	Timer: fast (1 s) Go Test Mana	ger all	Select All Sta	rt + Stop - Quie	esce Clear		SPEED (1) 1.56 Kbps/12.42 Kbps
Vie	w 0 - 20000	-	Go	Disp <u>l</u> ay Cr <u>e</u> ate	Mogify Batch N	Nodify Delete		
		Laye	r 4-7 Endpoints for Sele	ected Test Manager			_	
Name	0		Create/Modify	Layer 4-7 Endpoint			×	M ¹
	Name:	Dash-Video	Rpt Timer:	fast (1 s) 💌	Test Manager:	default_tm	T	
	Shelf:	1	Resource:	10 (21HHAG06) -	Port	0 (wlan0)(MGT)	-	
	IP Addr:	AUTO	Endp ID:	0				
	URLs per 10m:	100	Max Speed:	Infinite	1			
	URL Timeout:	10000 -	DNS Cache Timeout:	60 -				
	TFTP Block Size:	Default (512 B)	Quiesce:	3 (3 sec) 💌	Quiesce After:	Infinite (0)	-	Video URL PLAY
	Proxy Port:	0	Proxy Server:		Proxy Auth:			
	Proxy Auth Types:	Basic Digest NTLN	HTTP Compressio	on: 🔲 Gzip 🔲 Deflate		Ν		
	HTTP Auth Types:	🔲 Basic 🔲 Digest 🔲 GSS-	Negotiate 🔲 NTLM			142		○ MATE Terminal \odot $る$ $⊗$
	SSL Cert:	ca-bundle.crt	SMTP-From:		Agent/RCPT-TO:			File Edit View Search Terminal Help
	Media Source:	Dash (1) 👻	Media Quality:	4k(0) 🗸	Playbacks:	1	-	[lanforge@ct523c-881f ~]\$ ls /usr/local/lanforge/nginx/html/wifivideo/wifivideo.
	Random Seeks:	0 -	Minimum Duration:	Duration (0 sec)	Maximum Duration:	Duration (0 sec)	-	mpa /usr/local/lanforge/nginx/ <u>h</u> tml/wifivideo/wifivideo.mpd
Looped in to: lo	UL/DL:	Download -	⊯ IPv4	IPv6				[lanforge@ct523c-881f ~]\$
011	URL: <	http://192.168.1.42/wifivideo/	wifivideo.mpd					
Band_stee	Source/Dest File:	/dev/null						
	Get-URLs-Fron	n-File 🔲 Authenticate Serve	r 🔲 Use-Proxy 📃	Allow-Reuse Allow-Ca	ache 🗹 Enable 4XX	Show Headers		
	Bind DNS	FTP PASV FTP EPSV	Real Browser V	fideo Stream 🔲 Playback	s Random 🔲 Seeks	s Random		
Configure	Camorge	Apply	QK	Batch-Create	Cancel			
		Ba	nd_Streering					
					thinclient_drives			

14. Start the endpoint. The video will be play on the phone and the stats will be reported in the *Layer-4* tab in the GUI as well as on LANforge Interop app.

🕖 Applications Places System 🗟 📓 🍓 🌍 👻 📶 Th	u Mar 16, 22:40:56
🔯 👔 LANforge Manager 🗖 SM-A750F (as super 🛓 Batch Modify ADB 🛓 [WFi Gapacity Test] 📓 [MATE Terminal] 👔 [Netsmith configura 👔 [Message from LAN 👔 [VRU-1.1.000 - Cre	
LANforge Manager Version(5.4.6) SM-A750F (as superuser) (a)	
Control Reporting Windows Info Tests	
Chamber View Stop All Restart Manager Refresh HELP E LANforge InterOp	
Status Port.Mgr Layer-3 L3 Endps Layer 4-7 WanLinks RF-Generator LIVE_DATA SYS_INFO CHARTS	
Rpt Timer: Fast (1 s) 🛡 Go Test Manager all 💌 Select All Start + Stop- Quiesce Clear SPEED (41) 6.38 Kbps/82.52 Kbps	
View 0-20000 View Go Display Crgate Mogify Batch Modify Delete	
Layer 4-7 Endpoints for Selected Test Manager	i i
Name EID Type Status Total-URLs Bytes-RD Mean-Video-Format-BitRate Total-Buffers Total-Mait-Time Mean-Audio-Format-BitRate	
Dash Video 1.10.0.351 L4/Gen Run 13 13,465,143 366,837 1 243 188,217	
v Video URL PLAY	
Image:	
folder.png netsmith.png	l i
Band_steer26.pcap withoutsteer 56, lauhtnoutsprag	
Band Steering.ps installInterop.png	
Configure LANforge Band_Streering bashvideo.png wanlink.png	

The stats can also be viewed in the MPD file by using the command: vi wifivideo.mpd in the terminal.



Mpd file maps with bandwidth that is mentioned in LANforge InterOp app. From the Mpd we can observe bandwidth as 366837 which is same as mentioned above in InterOp.



If the network has issues, the bitrate goes down and the same can be reported in LANforge InterOp app. This can be tested using *WANlinks* in lanforge.

15. To create a WANlink go to the Status tab and select Netsmith.

🕜 Applications Places System 🗃 🔟 🍪 🥎 🚟 🚄	Thu Mar 16, 20:38
📷 🛃 LANforge Manager 💻 SM-A750F (as super 🛃 Batch Modify ADB 🏼 🙆 [WiFi	Capacity Test] 🔟 [MATE Terminal]
LANforge Manager Version(5.4.6)	
Control Reporting Windows Info Tests	
Chamber <u>V</u> iew <u>S</u> top All	Restart Manager Refresh HELP E LANforce InterOp
Test Mgr Resource Mgr Interop DUT Profiles Traffic-Profiles Alerts Warnings	Wifi-Messages
Status Port Mgr Layer-3 L3 Endps Layer 4-7	WanLinks RF-Generator Generic LIVE_DATA SYS_INFO CHARTS VIDEO
License Info Current Users	Saved Test Configurations
Licenses expire in: 196 days. Admin from:127.0.0.1 Configura	DFLT V Load
TR-398 gnuserver from:127.0.0.1 Downlo	ad DB Show Progress Delete
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Manager/Resource 1	
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Netsrijth	
eed Configure or view the Virtual Router and CX configuration for the selected resource(s).	
	Video URL PLAY
	TOTAL DUFFERS 1
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	TotalBandwidthBytes: 13465145 bytes
Netsmith Netsmith Netsmith Netsmith I	Netsmith Netsmith Netsmith Netsmith Netsmith Rebuffer Count: 0 Trat Would Figure 4:09
	Total Video Frames Dropped: 0
Netsmith	Mean Video Format Bitrate: 366837
Resources 2/16	Mean Audio Format Bitrate: 188217 Total Pause Buffer Count: 0
I	
Logged in to: localhost:4002 as: Admin	folder.png
Band steer 2G pcan without steer 5G launchGUI.	png III O <
300clients.pcap	
CONFIG	
Band Steering.ps installintero	uasimieua.piig
Configure LANforce	
Band Streering	
	bashvideo.png

16. Right-click in the Netsmith window and select New Connection.



17. Select Port 1-A as the port where the server is running (eth1 in this case) and skip Port 1-B. Click OK.

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🔯 : 🖾 [MATE T	erminal] 🔬 l	LANforge Manager 🌆 [Cham	nber View (5.4 🔬 [Batch N	lodity ADB 🖪 SM-A750F (a:	s super 🔟 [MAT	E Terminal]	Metsmith configurat	
0		Netsmith configuration for R	esource: ct523c-881f(1.1) V	ersion: 5.4.6	\odot \otimes \otimes			<u> </u>
0		Virtual Rout	ers and Connections		Ê		01010	×
o l						Ply.png	○ SM-A750F (as superuser) ⊙ ⊙ ⊗ ste	er_5G_
0	_		Right-cli	ck/double-click/drag supported.			14:43 🖻 🕫 😽 📢 🖏 💼 🚺	pcapng
-	0	Create/M	Aodify Connection	\otimes			■ LANforge InterOp	
			Interface-Cost:	1		after		
	Port 1.A	(1 (eth1)	RIP-Metric:	1			LIVE_DATA SYS_INFO CHARTS VIDEO	
			OSPF Area:	000.000.000			SPEED (1) 521.99 Kbps/53.46 Kbps	
	Port 1-B: Skip	<auto create="" new="" port=""></auto>	VRRP IP:	0.0.0/24				
	WanLink: Skip	<auto create="" new="" wanlink=""></auto>	VRRP ID:	1				
	Port 2-B: Skip	<auto create="" new="" port=""></auto>	VRRP Priority.	1				
	Port 2-A: Skip	<auto create="" new="" port=""></auto>	Next-Hop:			modif		
	DHCP Lease Time:	43200	Subnets (a.b.c.d/xx):					
	DHCP DNS:							a
	DHCP Range Min:							
Mot-eth0	DHCP Range Max					mp 🔶 mp	And 16 + 16 MU-MIMO to provide massive improvements in speed	r 26
eth1	DHCP Domain:			l			ts.p	pcapng
wiphy1	DHCPv6 DNS:		Next-Hop-IPv6:				Video UDI	
	DHCPv6 Range Min:		IPV6 Subnets (aaa::0/xx):			m	VIGEO URL PLAY	
	DHCPv6 Range Max						TOTAL BUFFERS: 1	×
	DHCPd Config File:						Mean Bandwidth: 6.529869875 Mbps Total PlayTime (sec): 81	r_5G_
				Í			totalBandwidthBytes: 9292005 bytes ts.p Rebuffer Count: 0	pcapng
	NAT DHO	P DHCPv6 Custom D	HCP VRRP Cand-P	P	₽ -	batch	Total Wait Time Ms: 344 Total Video Frames Dropped: 0	
		OK	Cancel		Ŧ		Total Seek Time Ms: 0 Mean Video Format Bitrate: 366837	
1	1				11+		Mean Audio Format Bitrate: 188217	
WanLinks	Show Legend	Fire IPv4s	Info Print	Sync Apply C	lose	install	Total Pause Buffer Count: 0	
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Veer WanLinks WanLink Config	Parents 🖌	Col. Domains 🔲 IPv6s Netsr	nith Status: OK				III O <	
				100 M. 100			10clients.pcap	
	ОК	and Street	ing	1.000	1 m	mp4t	ompd.png	
			"'g	bashvideo.png	wanlink.png			

Then click on Apply in the Netsmith window, the WANlink will be created between eth1 and rddvR1.





In Port manager this endpoint will also be reflected.



18. Click on the first of the two ports of the RDD pair, which will open a Configuration Window. Click the DHCP-IPv4 and HTTP checkbox.

Applica	ations Places System	n 🖂 💴 🍯) 🥱 🗧	2 🚄								Fri Ma	ır 17, 02:22:3
📷 i 💷 (N	ATE Terminal]	LANfor	ge Manage	r 🔬 [Char	nber View (5.4 🧾	[Batch Modify A	DB 🗖 SM-A75	0F (as super 💷 [MATE Terminal] 🛛 🔮	Netsmith configurat.	🌆 rddVR1 (ct52	23c-881	
				LANforge	Manager Version(5.4.6)		 Image: Second sec	\sim \otimes				
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			Cham	her View	Stop All	Pastart	Aanager	Defresh	HELD			X	
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							Driver Info: Por	t Type: Redirect-Device Peer	rddvR1b rddvR1b				
Rp	tTimer: medium (8	s) 🔻	Apply					Port Configura	hles				
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Port 1	Ø I IP	SEC	Alias Par	RX Byt	Standard Coringur	Extended	comg						
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1.011.2	0.0.00	0 and	ni wip	nyu	Set Bridge Info	IP Address:	0.0.0	Global IPv6:	AUTO		SG-FD	1001 ×	
1.011.4	0.0.0.0	0 im	q0			IP Mask:	0.0.0.0	Link IPv6:	AUTO	Renegotiate	10G-FD	eer 2G	
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							bashvideo.png	waniink.	ong				

19. Now go to *Wanlinks* tab and click on start option to run the connection. In the *Port Manager* the IP address will be allocated to the first (non-b) port of the RDD pair.

🕜 Applications Places System 🔄 🔤 🍯 🌍 🌄 📶	Fri Mar 17, 02:24:45
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Hide Stopped Display Crgate Modify Batch Modify Delete LIVE_DATA SYS_INFO CHARTS VDEO	
WanLinks for Selected Test Manager SPEED (41) 827 bps/2.64 Kbps nt. drives	
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All WanLink Endpoints ma	
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- VWR-1,1000 D None 1,544,000 0 2 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
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10dients.pcap	
OK mp4tompd.png	
and streering bashvideo.png wanlink.png	

20. Then, Click on *Stop* to bring the device out of test room.

🛅 i 🔬 LANforge Ma	anager 🚺 LA	Nforge Dialog (b								
0			LANforg	ge Manager	Version(5.4.6)			\odot \otimes \otimes	SM-0750E (as superuser) SA	
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	l	Start + Stop.	Uninstall	Discover	Mogity	Batch Modify	elete			
		\sim		-Android D	evices					
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1.1.03d60c790705		D4-Redmi_6_pro	9	28	sakura_india	Redmi_6_Pro	sakura_india	1033401959		
1.1.07f14f990406		B4-Redmi	10	29	lancelot_in	M2004J19C	lancelot	583273323	Tap for weather info	
1.1.1c77c45c		A1-Redmi	10	29	lavender	Redmi_Note_7S	lavender	1639924111		
1.1.3200f8664a91a5e9		B2-SamsungGA7	10	29	a7y18ltejt	SM_A750F	a7y18lte	1592459474		
1.1.343249980304		B3-Redmi	7.0	24	mido	Redmi_Note_4	mido	3293885		
1.1.47f02009	V	F2-M1A2	10	29	jasmine	Mi_A2	jasmine_sprout	1480481586		
1.1.48b5e3311020	~	F6-PocoM	10	29	citrus_in	M2010J19CI	citrus	2066903497		
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1.1.65a790ac	V	F1-MInote5Pro	9	28	whyred	Redmi_Note_5_Pro	whyred	888686251		
1.1.9234808		D3-MISpro	9	28	whyred	Redmi_Note_5_Pro	whyred	281270792		
1.1.95f6cat4		C5-V15Pro	10	30	1818	VIV0_1818	1818	160739707	G to	
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1 1 K7HIBIB6IROON7BE		G2-Lenovo	6.0	23	PR2-650M	Lenovo PB2 650M	PR2	2133555921		
1.1 LRYTEA9DOBNNYTH	7	A2-OppoA12	9	28	CPH2083	CPH2083	OP4BEB	1290928190		
1.1.R9PTA0IP9IY		C2-SamsungTab	12	31	ota8xx	SM X205	ota8	1000646220	Galaxy Gallery PlayStore Google Microsoft	
1.1.RO3006FX7U		G6-Sonyxa1	8.0.0	26	G3416	G3416	G3416	9917160	Store Apps	
1.1.c2526e3d	2	E3Vivo	10	29	1804	vivo 1804	1804	1740287573		
1.1.cdf6ceab0407		C3-PocoM2	10	29	shiva	M2004J19PI	shiva	1226019428		
1.1.e4a5acfa		B1-Realme2pro	10	29	RMX1801	RMX1801	RMX1801	997407002		
1.1.eb65c3e		C4-Redmi	10	29	lavender	Redmi_Note_7S	lavender	1905624741		
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21. Click on the *Batch Modify* and enter all the details in the screenshot below. LANforge Manager IP must be WAN link IP. Here rddVR1 is allocated with "192.168.1.90" IP address.

👔 💷 [MATE Terminal] 🛛 🔬 LANforge Manager 🗖 SM-A750F (as super 🎍 Batch Modify ADB	
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.1.03d60c790705 D4-Redmi_6_pro 9 28 sakura_india Redmi_6_Pro sakura_india BSSID 90.3cb3b1	1:70:0d
.1.07f14f990406 B4.Redmi 10 29 lancelot_in M2004J19C lancelot Signal -43	43 dBm
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.1.9ea50aa1 0 3 3 3 DNS2 0	0.0.0.0
1. PALINGITPOWOSX821 AG-Realme 11 30 RMX2002 RMX2002 RMX2002 DHCP Server 192.16	168.1.1
Batch Modify ADB Devices Gateway 1921F	168.1.1
1.1.cdf6ceab0407 LANforce Manager IP: 000 1 69 3 00 Y Encryption: wpa2 Y Apply LesseDuration 2160	500 Sec
.1.e4a5acfa WiFi Congested	NO
1.eb65C3e SSID: Band5 Teasword: Password: Password: Stop Cellular Congested	NO
FAD Method: NA FAD Identity NA FAD Dassword: NA	
Display: 192.168.200.223:1 Screen Size: 0.4 💌 🗹 Use scrcpy Launch GUI	
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Configure LANforge	
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22. Click *Layer 4-7* tab, create one cross-connect with the following details, *Apply* the changes, and play the video. Nginx will run on rddVR1.

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Here the Wanlink transfer rate is 1.54Mbps and the video bitrate reported is 366837. This can be observed in Layer 4-7 and in InterOp.

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24. Modify the WanLink to slow DSL and click on *Apply*. Video Bit rate is reduced to 173307.

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It clearly indicates that the Video Player has adapted the lower quality when network is slow.

We can observe the same in the .mpd file.

Candela Technologies, Inc., 2417 Main Street, Suite 201, Ferndale, WA 98248, USA www.candelatech.com | sales@candelatech.com | +1.360.380.1618