

ROUTING PERFORMANCE LCOS 10.94

This tech paper provides a performance overview of the R&S®LANCOM routers. The routers, which are typically used as CPE or branch office devices, and the VPN gateways of the ISG series, which are typically used as central devices, are presented in terms of routing and VPN/IPSec performance.

For a clear presentation of the test results and thus better comparability of performance, devices are grouped into [categories with similar hardware equipment](#).

The performance values shown are particularly suitable for comparing the different device categories with each other. They also allow conclusions to be drawn about the performance that can be expected in a real application. However, this may differ from the tech paper, e.g. because the device configuration, network environment or the measurement itself are different.

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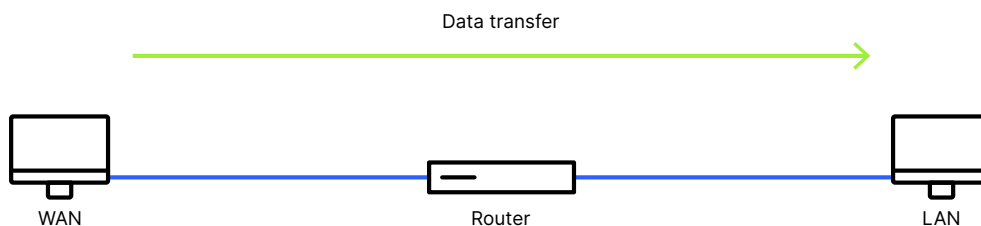
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Definition of performance and associated measurement setups

Performance UDP



With UDP, IP datagrams are sent without a connection - sometimes as a continuous data stream. In contrast to TCP, there are no internal protocol mechanisms that guarantee or confirm the successful transmission of individual datagrams. There is also no adaptation of the transmission rate to the characteristics of the transmission path (e.g. lines or devices).

For the measurement of UDP performance, this means that it is not the reliable transmission itself, but the measurement method that must reflect its behavior. This is usually done using a search method that determines the highest possible transmission rate (in constant packets per second) at which the packet losses on the receiving side remain below a defined threshold. In the measurements presented in the tech paper, this target threshold is generally 1%.

With manual simulation, you start with a low transmission rate and gradually increase it until the losses observed on the receiving end exceed the defined threshold.

Important: It is not permissible to simply select a transmission rate that is clearly too high and then only evaluate what is still arriving on the receiving end.

It should be noted that not only the device itself, but also the interfaces and lines used can limit the measurable performance. This is particularly evident in the UDP measurements: While the measurement results for smaller frames or packets still differ significantly between the various device categories, they largely converge for larger ones.

The following requirements must be observed when using UDP packet generators:

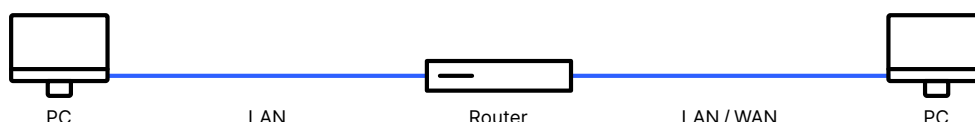
- ▶ Uniform transmission: All packets must be sent evenly at the packet or frame rate to be examined - not in bursts.
- ▶ Adapted packet size: The packet size should match the MTU (Maximum Transfer Unit) of the route so that the device to be examined does not have to perform any additional fragmentation. Important: The MTU can vary depending on the tunnel type. This is often less important for TCP measurements, as a negotiated MSS (Maximum Segment Size) is usually reduced by mechanisms such as MSS clamping on the router.
- ▶ No fragmentation: Only non-fragmented packets or frames should be generated. Fragments can - depending on the router settings - trigger complex reassembly.

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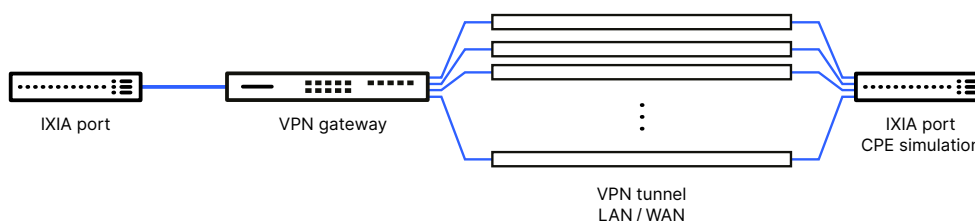
Measurement setup UDP

Various packet generators and search algorithms are used to measure UDP performance:

- Routing performance: TRex is used as a packet generator for pure routing performance. This runs under Linux on a standard PC.



- IPsec performance: For IPsec measurements, IxLoad from Keysight/IXIA is used on a PerfectStorm One appliance. This simulates one side of the VPN tunnel at a time, while the other side is taken over by the R&S®LANCOM device under test. This also allows tests to be carried out with a larger number of VPN tunnels that are terminated together on a R&S®LANCOM VPN gateway.



Definition measured values UDP

UDP measurements typically determine how many packets or Ethernet frames are successfully transmitted per second. A throughput value in Mbps is calculated by multiplying this by the total size of the respective IP packet or Ethernet frame.

These values are specified for a range of different packet sizes in the UDP measurement tables. The maximum possible packet size depends on whether it is an IPsec or a pure routing measurement, as the MTU in an IPsec tunnel is lower than on an unencrypted route due to the additional overhead.

In addition, some IMIX profiles are also taken into account in the measurements - i.e. mixtures of different packet sizes. Such "Internet mixes" simulate typical size distributions in real data traffic.

There is no binding standard for the selection of the frame sizes used. Therefore, in addition to the default setting of the IXIA test system (IMIX 0), two other common patterns are used: IMIX 1 and IMIX 2.

IMIX 1	IMIX 2	IMIX 3
64 bytes (45 %) 128 bytes (20 %) 256 bytes (5 %) 512 bytes (3 %) 1024 bytes (2 %) 1280 bytes (1 %) 1418 bytes (24 %) for IPsec resp. 1518 bytes (24 %) for Routing	64 bytes (58,4 %) 570 bytes (33,3 %), 1418 bytes (8,3 %) for IPsec resp. 1518 bytes (8,3 %) for Routing	90 bytes (58 %) 92 bytes (2 %) 594 bytes (24 %) 1418 bytes (16 %) for IPsec resp. 1518 bytes (16 %) for Routing

For the measurement, only a single tunnel is set up over the WAN link. However, the R&S®LANCOM ISG-5000 and ISG-8000 devices achieve higher total throughputs when several tunnels are used simultaneously.

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Performance TCP

With TCP, the transmission of each data segment is already monitored by the protocol itself. TCP dynamically adjusts the transmission rate on this basis, among other things. This automatically sets the maximum possible performance that can be achieved via the devices and lines involved.

However, TCP measurements are highly dependent on the specific endpoints used - for example, the PC or mobile device, the network adapter (NIC) and its TCP offloading capabilities, the TCP stack of the respective operating system, the browser used, etc.

These components influence both the internal control of TCP behavior and the overhead caused by TCP.

The properties of the underlying WAN route also have an impact on TCP performance. Delay/latency, jitter and packet loss are particularly important factors here.

The relationship between the latency time (RTT, round-trip time) and the TCP window parameters plays a central role here. These buffer sizes must be sufficiently dimensioned to compensate for the delay on the connection. The required size results from the so-called BDP (Bandwidth-Delay Product) of the route.

To ensure that the measured performance is not artificially limited, the TCP implementation or generator used must actually be able to utilize this BDP.

Measurement setup TCP

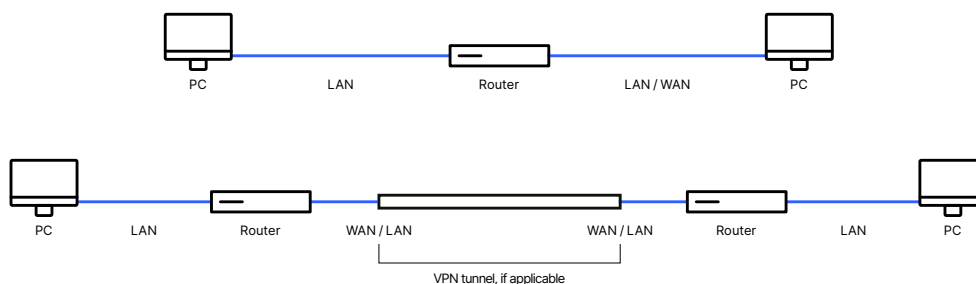
The measurements shown are intended to provide an orientation with regard to the performance of different routing and tunnel variants.

Two scenarios are considered in each case:

- Single system: A single device under test.
- Two-point scenario: Two devices of the same type that are connected to each other via a WAN link. Different tunnel types are configured and compared on this route.

Linux-based PCs are used to measure TCP performance. A distinction is made between two types of measurement:

- TCP measurement with iperf3: The iperf3 tool is used here to carry out targeted TCP throughput measurements.
- HTTP measurement with nginx and siege: In this scenario, data is transferred between an nginx web server and the siege tool, which serves as an HTTP load generator.



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Definition measurement values TCP

The information relates exclusively to the transported user data - for example, the transfer of larger files or complete HTTP pages.

General information vRouter

For the UDP-IPSec measurements, a vRouter was operated on a Xeon E-2176G @ 3.7 GHz under an ESXi hypervisor. Intel X710 adapters via VMXNET3 were used as network interfaces.

For the TCP/HTTP measurements, a vRouter was used on a Xeon E3-1230v5 @ 3.4 GHz, also under ESXi, was used for the TCP/HTTP measurements. Intel X710 interfaces with VMXNET3 were also used here.

The performance of a vRouter depends heavily on the host system used - in particular on its hardware, configuration and parallel use by other virtual machines.

The measured values shown in the tech paper therefore only provide a rough guide for vRouters. In contrast, hardware-based devices offer a much higher degree of practical relevance due to their fixed system environment.

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Category assignment of the devices under test (DUT) for a better overview of the measurement results

In the left-hand column of the following table you will find the name of your R&S®LANCOM device. The corresponding device category is shown in the right-hand column.

Using this category, you can clearly assign the corresponding performance values for your device in the tables on the following pages.

LANCOM device name	Device category
1650E	A
1800EF, 1800EF-4G, 1800EF-5G, 1800EFW IGR-750EF-5G	B
1800VA 1800VA-4G 1800VAW 1800VAW-4G 1803VA 1803VA-4G 1803VAW 750-5G IAP-5G OAP-5G	C
1800EFW-5G 1800VA-5G 1803VA-5G 1803VAW-5G 1930EF 1930EF-5G 1936VAG 1936VAG-5G	D
1926VAG-4G	E
2100EF ISG-5000	G
ISG-8000	H
vRouter	I

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UDP measurement values for all devices

Note: When using large frames, the measured performance may not be limited by the device performance itself, but by the bandwidth of the Ethernet interfaces used (1G or 10G).

Table 01 - WAN-LAN routing / IMIX												
Throughput [Mbps] @ frame size [bytes] and frame rate [fps]												
Category	Reference	64	128	256	512	1,024	1,280	1,518	IMIX 1	IMIX 2	IMIX 3	
A	1650E	83	166	332	665	972	972	986	624	449	551	Mbps
		162,000	162,000	162,000	162,000	118,000	95,000	81,200	162,000	162,000	162,000	fps
B	1800EF	94	183	345	670	972	972	986	638	477	576	Mbps
		185,000	178,000	168,000	163,000	118,000	95,000	81,200	166,000	172,000	170,000	fps
C	1800VAW-4G	78	157	313	630	972	976	977	588	426	519	Mbps
		153,000	153,000	153,000	153,000	118,000	95,300	80,400	153,000	153,000	153,000	fps
D	1800VA-5G	98	197	395	787	972	976	977	738	534	654	Mbps
		192,000	192,000	192,000	192,000	118,000	95,300	80,400	192,000	192,000	192,000	fps
E	1926VAG	79	157	315	630	972	976	977	588	423	519	Mbps
		154,000	153,000	153,000	153,000	118,000	95,300	80,400	153,000	153,000	153,000	fps
G	ISG-5000	371	740	1,470	2,810	5,800	7,200	8,470	2,650	1,990	2,430	Mbps
		725,000	722,000	720,000	686,000	708,000	703,000	697,000	691,000	720,000	717,000	fps
H	ISG-8000	758	1,510	3,020	6,060	9,720	9,790	9,860	5,660	4,080	5,000	Mbps
		1,480,000	1,470,000	1,470,000	1,480,000	1,180,000	956,000	812,000	1,470,000	1,470,000	1,470,000	fps
I	vRouter	572	1,100	2,160	4,350	7,880	9,720	9,860	3,960	2,990	3,470	Mbps
		1,110,000	1,070,000	1,050,000	1,060,000	962,000	950,000	812,000	1,030,000	1,080,000	1,020,000	fps

Table 02 - LAN-WAN routing / IMIX												
Throughput [Mbps] @ frame size [bytes] and frame rate [fps]												
Category	Reference	64	128	256	512	1,024	1,280	1,518	IMIX 1	IMIX 2	IMIX 3	
A	1650E	76	154	309	624	972	972	986	580	415	513	Mbps
		150,000	151,000	151,000	152,000	118,000	95,000	81,200	151,000	150,000	151,000	fps
B	1800EF	90	174	327	645	972	972	986	600	449	542	Mbps
		176,000	170,000	160,000	157,000	118,000	95,000	81,200	156,000	162,000	160,000	fps
C	1800VAW-4G	62	123	249	499	972	976	977	468	337	416	Mbps
		122,000	120,000	121,000	121,000	118,000	95,300	80,400	121,000	121,000	122,000	fps
D	1800VA-5G	70	141	281	563	972	976	977	528	380	466	Mbps
		137,000	138,000	137,000	137,000	118,000	95,300	80,400	137,000	137,000	137,000	fps
E	1926VAG	64	128	257	515	972	976	977	483	348	426	Mbps
		125,000	125,000	125,000	125,000	118,000	95,300	80,400	125,000	125,000	125,000	fps
G	ISG-5000	264	538	1,080	2,160	4,760	5,320	6,550	2,050	1,490	1,810	Mbps
		517,000	525,000	531,000	528,000	582,000	520,000	539,000	534,000	540,000	534,000	fps
H	ISG-8000	745	1,500	2,890	5,880	9,720	9,790	9,860	5,590	4,110	5,040	Mbps
		1,450,000	1,460,000	1,410,000	1,430,000	1,180,000	956,000	812,000	1,450,000	1,480,000	1,480,000	fps
I	vRouter	473	979	1,880	3,680	7,520	8,890	9,630	3,550	2,570	2,920	Mbps
		925,000	956,000	918,000	900,000	918,000	868,000	793,000	925,000	931,000	862,000	fps

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Table 03 - LAN-LAN routing / IMIX											
Throughput [Mbps] @ frame size [bytes] and frame rate [fps]											
Category	Reference	64	128	256	512	1,024	1,280	1,518	IMIX 1	IMIX 2	IMIX 3
A	1650E	98	197	394	788	972	972	986	739	529	648
		192,000	192,000	192,000	192,000	118,000	95,000	81,200	192,000	192,000	192,000
B	1800EF	115	222	409	798	972	972	986	744	560	669
		225,000	217,000	200,000	195,000	118,000	95,000	81,200	193,000	202,000	197,000
C	1800VAW-4G	112	224	449	896	972	976	977	663	480	585
		219,000	219,000	219,000	218,000	118,000	95,300	80,400	172,000	173,000	172,000
D	1800VA-5G	90	179	358	713	972	976	977	822	592	728
		175,000	175,000	175,000	174,000	118,000	95,300	80,400	214,000	214,000	214,000
E	1926VAG	92	184	368	732	972	976	977	669	482	590
		179,000	179,000	179,000	178,000	118,000	95,300	80,400	174,000	174,000	174,000
G	ISG-5000	388	771	1,540	3,040	6,080	7,600	8,980	2,870	2,060	2,500
		759,000	753,000	753,000	742,000	742,000	742,000	739,000	748,000	745,000	739,000
H	ISG-8000	809	1,600	3,210	6,420	9,720	9,790	9,860	6,020	4,300	5,300
		1,580,000	1,560,000	1,560,000	1,560,000	1,180,000	956,000	812,000	1,560,000	1,550,000	1,560,000
I	vRouter	521	1,010	2,030	3,940	7,680	9,340	9,860	3,860	2,780	3,300
		1,010,000	993,000	993,000	962,000	937,000	912,000	812,000	1,000,000	1,00,000	975,000

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		Throughput [Mbps] @ frame size [bytes] and frame rate [fps]						
Category	Reference	64	128	256	512	1,024	1,280	1,418
A	1650E	48.8	99.8	192	378	728	906	941
		95,400	97,400	93,700	92,200	88,800	88,400	82,900
B	1800EF	77.7	153	292	549	931	943	948
		151,000	149,000	142,000	134,000	113,000	92,000	83,600
C	1800VAW-4G	46.2	92.5	185	375	747	911	947
		90,200	90,300	90,500	91,500	91,200	88,900	83,400
D	1800VA-5G	68.9	141	291	583	930	943	948
		134,000	137,000	141,000	142,000	113,000	92,100	83,600
E	1926VAG	44.4	91.5	183	369	727	904	941
		86,600	89,300	89,100	90,000	88,700	88,300	82,900
G	ISG-5000	237	467	900	1,750	3,330	4,120	4,570
		463,000	456,000	439,000	429,000	406,000	403,000	403,000
H	ISG-8000	447	790	1,450	2,880	4,440	5,140	5,160
		873,000	771,000	711,000	703,000	543,000	502,000	455,000
I	vRouter	389	759	1,440	2,710	4,600	5,180	5,160
		760,000	741,000	704,000	662,000	561,000	506,000	455,000

		Throughput [Mbps] @ frame size [bytes] and frame rate [fps]						
Category	Reference	64	128	256	512	1,024	1,280	1,418
A	1650E	40.6	107	232	454	881	944	940
		74,600	101,000	111,000	109,000	106,000	91,700	82,600
B	1800EF	112	219	429	858	928	948	944
		205,000	207,000	206,000	206,000	112,000	92,000	83,000
C	1800VAW-4G	54.8	105	214	422	831	948	952
		100,000	99,700	102,000	101,000	100,000	91,300	82,900
D	1800VA-5G	90.5	178	350	698	935	948	952
		166,000	168,000	167,000	167,000	112,000	91,700	83,100
E	1926VAG	52.9	107	210	408	797	940	952
		97,300	100,000	100,000	98,000	96,500	91,100	82,900
G	ISG-5000	291	560	1,050	1,920	3,250	3,890	4,290
		533,000	525,000	507,000	463,000	396,000	379,000	376,000
H	ISG-8000	578	1,070	2,530	4,130	5,250	5,200	5,180
		1,050,000	1,000,000	1,210,000	1,000,000	639,000	506,000	455,000
I	vRouter	427	824	1,550	2,770	4,590	5,200	5,180
		783,000	774,000	748,000	668,000	557,000	506,000	455,000

		Throughput [Mbps] and frame rate [fps]					
Category	Reference	Decryption			Encryption		
		IMIX 1	IMIX 2	IMIX 3	IMIX 1	IMIX 2	IMIX 3
A	1650E	310	213	221	270	218	249
		84,100	77,200	65,100	72,000	78,000	72,800
B	1800EF	446	308	300	334	259	243
		120,000	111,000	87,800	88,800	92,000	71,100
C	1800VAW-4G	333	252	306	379	293	349
		90,200	91,100	90,200	101,000	104,000	101,000
D	1800VA-5G	513	380	472	607	455	550
		139,000	137,000	139,000	162,000	161,000	160,000
E	1926VAG	321	247	293	364	277	334
		87,200	89,500	86,900	97,300	98,400	97,600
G	ISG-5000	1,550	1,170	1,360	1,660	1,260	1,520
		421,000	427,000	402,000	446,000	452,000	444,000
H	ISG-8000	2,390	1,860	2,310	4,010	3,110	3,670
		649,000	674,000	684,000	1,070,000	1,110,000	1,070,000
I	vRouter	2,500	1,910	2,290	2,490	2,020	2,300
		680,000	692,000	676,000	669,000	722,000	672,000

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UDP measurement values for devices with 10G interfaces

Note: For large frames or TCP, the measured performance may not be determined by the performance of the device, but is limited by the Ethernet interfaces (1G or 10G).

Table 07 - IPSec 10 tunnel AES-GCM via LAN - decryption									
		Throughput [Mbps] @ frame size [bytes] and frame rate [fps]							
Category	Reference	64	128	256	512	1,024	1,280	1,418	
G	ISG-5000	221	449	1,020	1,760	3,480	4,080	4,400	Mbps
		431,000	438,000	500,000	430,000	425,000	398,000	388,000	fps
H	ISG-8000	406	1,210	2,470	4,830	9,320	9,450	9,480	Mbps
		1,180,000	1,180,000	1,200,000	1,180,000	1,130,000	923,000	835,000	fps
I	vRouter	342	674	1,310	2,430	4,120	5,100	5,530	Mbps
		667,000	658,000	640,000	594,000	503,000	498,000	488,000	fps

Table 08 - IPSec 10 tunnel AES-GCM via LAN - encryption									
		Throughput [Mbps] @ frame size [bytes] and frame rate [fps]							
Category	Reference	64	128	256	512	1,024	1,280	1,418	
G	ISG-5000	255	453	698	1,950	3,470	4,080	4,540	Mbps
		466,000	428,000	335,000	468,000	419,000	397,000	396,000	fps
H	ISG-8000	788	1,400	2,910	5,660	9,430	9,540	9,500	Mbps
		1,430,000	1,330,000	1,390,000	1,350,000	1,130,000	923,000	835,000	fps
I	vRouter	372	602	1,370	2,630	4,430	4,830	4,660	Mbps
		683,000	570,000	659,000	635,000	539,000	466,000	409,000	fps

Table 09 - IPSec 10 tunnel AES-GCM via LAN - decryption / encryption IMIX									
		Throughput [Mbps] and frame rate [fps]							
Category	Reference	Decryption			Encryption				
		IMIX 1	IMIX 2	IMIX 3	IMIX 1	IMIX 2	IMIX 3		
G	ISG-5000	1,630	1,290	1,050	1,210	992	1,110	Mbps	
		444,000	468,000	309,000	324,000	354,000	325,000	fps	
H	ISG-8000	4,380	3,230	3,970	5,120	3,810	4,680	Mbps	
		1,190,000	1,170,000	1,170,000	1,360,000	1,360,000	1,350,000	fps	
I	vRouter	2,130	1,750	1,670	1,970	1,290	2,140	Mbps	
		578,000	632,000	495,000	528,000	457,000	622,000	fps	

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Table 10 - IPSec 10 tunnel AES-GCM via WAN - decryption									
		Throughput [Mbps] @ frame size [bytes] and frame rate [fps]							
Category	Reference	64	128	256	512	1,024	1,280	1,418	
G	ISG-5000	213	460	942	1,690	3,210	4,010	4,420	Mbps
		416,000	448,000	459,000	414,000	392,000	392,000	390,000	fps
H	ISG-8000	552	1,060	2,170	4,280	8,590	9,450	9,470	Mbps
		1,070,000	1,040,000	1,060,000	1,040,000	1,040,000	923,000	835,000	fps
I	vRouter	390	755	1,410	2,620	4,590	5,390	5,850	Mbps
		761,000	737,000	692,000	641,000	560,000	527,000	516,000	fps

Table 11 - IPSec 10 tunnel AES-GCM via WAN - decryption									
		Throughput [Mbps] @ frame size [bytes] and frame rate [fps]							
Category	Reference	64	128	256	512	1,024	1,280	1,418	
G	ISG-5000	272	524	1,050	2,030	3,320	4,120	4,220	Mbps
		497,000	493,000	504,000	491,000	401,000	400,000	371,000	fps
H	ISG-8000	751	1,430	2,860	5,390	9,390	9,540	9,500	Mbps
		1,370,000	1,340,000	1,360,000	1,300,000	1,130,000	923,000	835,000	fps
I	vRouter	412	802	1,510	2,590	4,590	5,460	5,720	Mbps
		757,000	755,000	720,000	628,000	557,000	531,000	503,000	fps

Table 12 - IPSec 10 tunnel AES-GCM via WAN - decryption / encryption IMIX									
		Throughput [Mbps] and frame rate [fps]							
Category	Reference	Decryption			Encryption				
		IMIX 1	IMIX 2	IMIX 3	IMIX 1	IMIX 2	IMIX 3		
G	ISG-5000	1,390	1,040	1,030	1,500	1,100	978	Mbps	
		377,000	379,000	304,000	401,000	395,000	283,000	fps	
H	ISG-8000	3,930	2,920	3,560	5,040	3,780	4,570	Mbps	
		1,060,000	1,050,000	1,050,000	1,340,000	1,340,000	1,330,000	fps	
I	vRouter	2,340	1,850	1,920	2,120	1,870	1,680	Mbps	
		636,000	670,000	571,000	567,000	668,000	490,000	fps	

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TCP measurement values for all devices

Note: When using large frames or TCP transfers, the measured performance may not be limited by the device performance itself, but by the bandwidth of the Ethernet interfaces used (1G or 10G).

Table 13 - iPerf single DUT routing				
Throughput [Mbps] for 5 parallel transfers				
Category	Reference	LAN download / upload	WAN download	WAN upload
A	1650E	926	926	926
B	1800EF	938	938	938
C	1800VAW-4G	940	940	936
D	1800VA-5G	940	940	937
E	1926VAG	926	925	925
G	ISG-5000	8,030	6,240	5,740
H	ISG-8000	9,400	9,400	9,400
I	vRouter	9,400	9,400	9,400

Table 14 - HTTP single DUT routing				
Throughput [Mbps] for 5 parallel transfers				
Category	Reference	LAN download / upload	WAN download	WAN upload
A	1650E	909	907	907
B	1800EF	928	931	932
C	1800VAW-4G	931	921	931
D	1800VA-5G	933	929	928
E	1926VAG	912	909	911
G	ISG-5000	4,680	4,640	4,700
H	ISG-8000	9,400	9,400	9,400
I	vRouter	9,400	9,400	9,400

Table 15 - iPerf DUT2DUT WAN routing						
Throughput [Mbps] for 5 parallel transfers						
Category	Reference	IPv4	PPP NAT	L2TP	EOGRE tunnel	L2TPv3 tunnel via LAN bridge
A	1650E	915	903	795	894	880
B	1800EF	940	935	747	916	908
C	1800VAW-4G	931	927	771	701	735
D	1800VA-5G	934	928	781	780	814
E	1926VAG	907	904	796	751	799
G	ISG-5000	5,330	5,040	2,580	2,960	3,120
H	ISG-8000	9,400	7,690	7,310	5,980	5,530
I	vRouter	9,120	8,970	6,080	5,760	4,860

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Table 16 - iPerf DUT2DUT WAN routing via VPN

Throughput [Mbps] for 5 parallel transfers					
Category	Reference	IPSec tunnel AES-CBC	IPSec tunnel AES-GCM	L2TPv3 tunnel in IPSec tunnel AES-GCM	WireGuard
A	1650E	756	806	530	496
B	1800EF	891	903	775	517
C	1800VAW-4G	777	820	473	310
D	1800VA-5G	883	896	600	314
E	1926VAG	812	811	469	304
G	ISG-5000	796	3,950	2,170	2,970
H	ISG-8000	1,620	4,930	5,010	7,420
I	vRouter	1,400	4,230	2,580	2,500

Table 17 - HTTP DUT2DUT WAN routing

Throughput [Mbps] for 5 parallel transfers					
Category	Reference	IPv4	PPP NAT	L2TP	L2TPv3 tunnel via LAN bridge
A	1650E	905	902	878	884
B	1800EF	930	926	905	895
C	1800VAW-4G	921	922	883	844
D	1800VA-5G	921	921	877	889
E	1926VAG	905	900	879	874
G	ISG-5000	3,660	3,640	2,520	2,890
H	ISG-8000	9,310	7,580	7,500	6,000
I	vRouter	8,920	8,790	5,920	4,920

Table 18 - HTTP DUT2DUT WAN routing via VPN

Throughput [Mbps] for 5 parallel transfers					
Category	Reference	IPSec tunnel AES-CBC	IPSec tunnel AES-GCM	L2TPv3 tunnel in IPSec tunnel AES-GCM	WireGuard
A	1650E	855	860	598	496
B	1800EF	880	893	857	517
C	1800VAW-4G	864	883	527	310
D	1800VA-5G	870	886	713	314
E	1926VAG	860	876	514	304
G	ISG-5000	778	3,400	2,170	2,970
H	ISG-8000	1,620	5,080	4,760	7,420
I	vRouter	1,410	4,150	2,590	2,500

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