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CUBE/vCUBE/MediaProxy Performance and Sizing Guidelines for IOS-XE based platforms

(C8200, C8300, ISR1100, ISR4K, ASR1K, CSR1K, C8KV)

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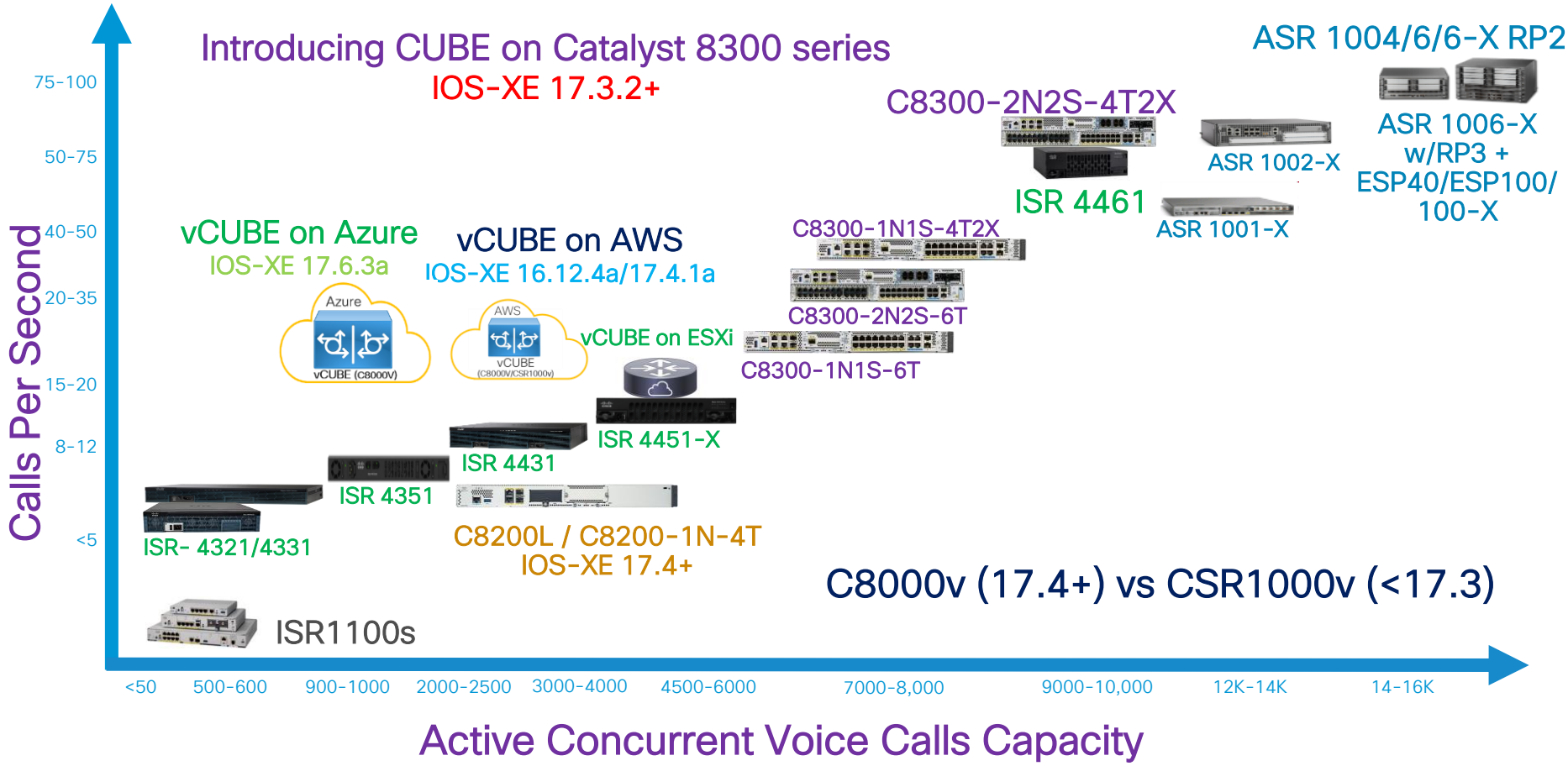
CUBE (Enterprise) Product Portfolio [Not to Scale]



CUBE/IOS-XE Software Release Mapping

CUBE Version	Initial IOS-XE Release for this CUBE version and Release date		Subsequent IOS-XE Release for this CUBE version
14.2	17.4.1a	Nov 2020	17.4.2
14.3	17.5.1	March 2021	17.5.1a
14.4	17.6.1a	July 2021	17.6.6a
14.4	17.7.1a	Nov 2021	17.7.2
14.5	17.8.1a	March 2022	
14.6	17.9.1a	July 2022	17.9.5a
14.6	17.10.1a	Nov 2022	
14.6	17.11.1a	March 2023	
14.7	17.12.1a	July 2023	17.12.2
14.8	17.13.1a	Nov 2023	
14.9	17.14.1a	March 2024	
14.10	17.15.1a	July 2024	

Last release for ISR4K except ISR4461

CUBE / vCUBE / MediaProxy Performance and Sizing

Sizing CUBE Enterprise On-Prem deployments

NOTE : Sizing information is only intended as a guideline. Actual session count will vary based on the number of features enabled, along with CUBE and the IOS-XE version being used.

Testing Methodology

Testing Benchmark guidelines

- Simple call flows (14 SIP messages per call), for example:
  - Basic Collaboration IP Telephony Calls (IP Phone registered to UCM making a PSTN call via a SIP trunk to CUBE)
  - Inbound IVR sessions for Contact Center
- Complex Call flows (40 SIP messages per call), for example:
  - UCCE Inbound Comprehensive Transfer flow
  - REFER based transfers
- Platform is tested with a constant call presentation rate – the presented CPS value – with one type of call flow. Call Hold Time (CHT) is set for 180 seconds
- CPS is the maximum *sustainable average presentation* rate. Higher instantaneous presentation rates are possible, but this is not tested.
- Tests focus on the number of successful simultaneous or concurrent active call handling at around 70% CPU and memory utilization[1]. Buffer allows for other features that might be configured / required in IOS-XE
- All CUBE platforms are tested with static IP routing configured for the next hop

1 For an ISR4461, starting IOS-XE 17.3.2 or later (VoIP Trace on by default), testing benchmark is at 80% memory utilization.

General Guidelines

CUBE Sizing Guidelines

- All sizing information is based on platforms with the following memory configurations. Using a different memory configuration may result in different sizing limits.
  - 16GB of control plane (CP) memory for C8300-2N2S-4T2X
  - 8GB of CP memory for C8300 (1N1S-4T2X, 2N2S-6T, and 1N1S-6T), C8200-1N-4T
  - 16GB of memory for ASR1K series – 8 GB (Control Plane memory) for ISR4400 series
  - 4 GB for ISR4300 series and C8200L-1N-4T
- Starting IOS-XE 17.4.1, CSR1000v (vCUBE) has been rebranded as follows with the corresponding minimum vRAM required:
  - CSR1K 1vCPU -> C8000V-S [4GB vRAM required]
  - CSR1K 2vCPU -> C8000V-M [5GB vRAM required] (Alternatively, 4GB may be used if booting from component install.)
  - CSR1K 4 vCPU -> C8000V-L [8GB vRAM required]
- Session count (end to end calls through CUBE) is dependent on the amount of memory in the platform. Numbers listed in the datasheet and in this document are based on above memory requirements being satisfied.
- CUBE + IOS based S/W MTP co-location: 1 S/W MTP session on the platform = 1 CUBE IPT session, when specific data tables are not available, and not to exceed total CUBE Collab numbers combined

CUBE Sizing Guidelines

- CUBE HA has less than 5% impact on number of sessions under full load
- Complex call flows (Cisco UCCE) can reduce CPS and session count. With IOS-XE 16.12+, there is significant performance gain for UCCE call flows
- SRTP with SIP TLS : Numbers will vary based on crypto algorithm and codec used
- **SRTP pass-thru session count and CPS same as RTP-RTP call flows**
- SIP Header manipulation through SIP profiles has less than 5% impact on number of sessions. Impact of SDP manipulation will be slightly higher compared to SIP headers. For example, 6% for changing the codec order in the m-lines
- Media forking for call recording can have a 50% impact on IPT session count regardless of the call type (IPT or UCCE) being recorded on CUBE Enterprise. This includes SIPREC, CUBE ORA with Cisco MediaSense, and CUCM NBR.
- CUBE Media Proxy **cannot** be co-located with CUBE Enterprise
- Performance numbers will be published for long lived (July) releases. [16.12, 17.3, etc]

Call Admission Control (CAC)

- Call processing capacity for any CUBE instance will be influenced by several considerations, including software version, features configured and the platform itself
- To ensure that calls continue to be processed reliably, configure Call Admission Control as follows to reject calls when use of system resources exceeds 80%[1]. Refer to the CUBE Configuration Guide for further details

```
enable
conf t
 call threshold global cpu-avg low 75 high 80
 call threshold global total-mem low 75 high 80
 call treatment on
end
```

- `show call active total-calls` lists the total number of concurrent calls on a CUBE platform

1 For an ISR4461, starting IOS-XE 17.3.2 or later, testing benchmark is at 80% memory utilization. Configure the memory threshold CAC accordingly.

```
call threshold global total-mem low 80 high 85
```

Collab Calls –
Basic IP Telephony Audio Calls

CUBE IP Telephony (Collab) Session Capacity Summary

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	CUBE SIP-SIP Audio Sessions (Flow-thru) RTP(G711)-RTP(G711)	Sustainable CPS IOS-XE 16.12+
1100 series (Default DRAM)	500	5
4321	500	4
4331	1000	10
4351	2000	13
4431	3000	15
4451	6000	40
4461	10000 (IOS-XE 17.2.1r+)	55
C8200L-1N-4T (4 GB)	1500 (IOS-XE 17.5.1+)	9
C8200-1N-4T (8 GB)	2500 (IOS-XE 17.4.1a+)	14
C8300-1N1S-6T (8 GB)	7000 (17.3.2)	40
C8300-2N2S-6T (8 GB)	7500 (17.3.2)	42
C8300-1N1S-4T2X (8 GB)	8000 (17.3.2)	45
C8300-2N2S-4T2X (16 GB)	10000 (17.3.2)	55
C8000V-S/CSR1Kv - 1 vCPU[1] (4 GB)	1000	5
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)*	3000	20
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	6000	30

* vCUBE in AWS/Azure session counts same as CSR1Kv - 2 vCPU

CUBE IP Telephony (Collab) Session Capacity Summary

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Count IOS-XE 16.12+ RTP(G711)-RTP(G711)	Sustainable CPS IOS-XE 16.12+
ASR1001-X	12000	50
ASR1002-X	14000	55
ASR1006-X RP3 ESP40/ESP100	16000	65
ASR1004/6/6-X RP2/ESP40	16000	70

Collab Calls –

Encrypted Audio Calls

- SRTP–RTP
- SRTP–SRTP

CUBE Encrypted IPT Audio Call Capacity

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Audio IP Telephony calls RTP(G711)-RTP(G711)	Encrypted Audio (SHA1_80) calls sRTP(G711)-RTP(G711)	CPS
1100 series (Default DRAM)	500	300	2
4321 (4 GB)	500	300	1
4331 (4 GB)	1000	600	3
4351 (4 GB)	2000	750	4
4431 (8 GB)	3000	750	4
4451 (8 GB)	6000	2100 (16.12.2)	11
4461 (8 GB)	10000 (17.2.1r)	8000 (17.9.2)	30
C8200L-1N-4T (4 GB)	1500 (17.5.1)	400 (17.5.1)	3
C8200-1N-4T (8 GB)	2500 (17.4.1)	650 (17.4.1)	4
C8300-1N1S-6T (8 GB)	7000 (17.3.2)	1600 (17.3.2)	9
C8300-2N2S-6T (8 GB)	7500 (17.3.2)	1800 (17.3.2)	10
C8300-1N1S-4T2X (8 GB)	8000 (17.3.2)	2100 (17.3.2)	12
C8300-2N2S-4T2X (16 GB)	10000 (17.3.2)	4300 (17.3.2)	24
C8000V-S/CSR1Kv - 1 vCPU[1] (4 GB)	1000	300	1
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	3000	1000	6
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	6000	1080	6

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls w/SHA1_80 sRTP(G711)-RTP(G711)	CPS
ASR1001-X (16 GB)	12000	2700	13
ASR1002-X (16 GB)	14000	6500	36
ASR1004/6/6-X RP2/ESP40 (16 GB)	16000	3500	20

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls w/GCM128 sRTP(G711)-RTP(G711)	CPS
1100 series (Default DRAM)	500	300	2
4321 (4 GB)	500	300	1
4331 (4 GB)	1000	600	3
4351 (4 GB)	2000	750	4
4431 (8 GB)	3000	750	4
4451 (8 GB)	6000	2100 (16.12.2)	11
4461 (8 GB)	**10000 (17.2.1r)**	**8000 (17.9.2)**	**30**
C8200L-1N-4T (4 GB)	**1500 (17.5.1)**	**500 (17.5.1)**	**3**
C8200-1N-4T (8 GB)	**2500 (17.4.1)**	**850 (17.4.1)**	**5**
C8300-1N1S-6T (8 GB)	**7000 (17.3.2)**	**2000 (17.3.2)**	**11**
C8300-2N2S-6T (8 GB)	**7500 (17.3.2)**	**2100 (17.3.2)**	**12**
C8300-1N1S-4T2X (8 GB)	**8000 (17.3.2)**	**2500 (17.3.2)**	**14**
C8300-2N2S-4T2X (16 GB)	**10000 (17.3.2)**	**5000 (17.3.2)**	**28**
C8000V-S/CSR1Kv - 1 vCPU[1] (4 GB)	1000	300	1
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	3000	1000	6
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	6000	1080	6

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls w/GCM128 sRTP(G711)-RTP(G711)	CPS
ASR1001-X (16 GB)	12000	2400	13
ASR1002-X (16 GB)	14000	6000	32
ASR1004/6/6-X RP2/ESP40 (16 GB)	16000	3200	18

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls w/GCM256 sRTP(G711)-RTP(G711)	CPS
1100 series (Default DRAM)	500	300	2
4321 (4 GB)	500	300	2
4331 (4 GB)	1000	600	4
4351 (4 GB)	2000	750	4
4431 (8 GB)	3000	750	4
4451 (8 GB)	6000	2100 (16.12.2)	6
4461 (8 GB)	**10000 (17.2.1r)**	**8000 (17.9.2)**	**30**
C8200L-1N-4T (4 GB)	**1500 (17.5.1)**	**500 (17.5.1)**	**3**
C8200-1N-4T (8 GB)	**2500 (17.4.1)**	**800 (17.4.1)**	**5**
C8300-1N1S-6T (8 GB)	**7000 (17.3.2)**	**1800 (17.3.2)**	**10**
C8300-2N2S-6T (8 GB)	**7500 (17.3.2)**	**2100 (17.3.2)**	**12**
C8300-1N1S-4T2X (8 GB)	**8000 (17.3.2)**	**2300 (17.3.2)**	**13**
C8300-2N2S-4T2X (16 GB)	**10000 (17.3.2)**	**4800 (17.3.2)**	**27**
C8000V-S/CSR1Kv - 1 vCPU[1] (4 GB)	1000	300	1
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	3000	1000	6
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	6000	1080	6

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls w/GCM256 sRTP(G711)-RTP(G711)	CPS
ASR1001-X (16 GB)	12000	2000	10
ASR1002-X (16 GB)	14000	4500	25
ASR1004/6/6-X RP2/ESP40 (16 GB)	16000	2700	15

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls SHA1_80 – GCM128 sRTP(G711) – sRTP(G711)	CPS
1100 series (Default DRAM)	500	150	1
4321 (4 GB)	500	150	1
4331 (4 GB)	1000	300	2
4351 (4 GB)	2000	375	2
4431 (8 GB)	3000	375	2
4451 (8 GB)	6000	540	3
4461 (8 GB)	**10000 (17.2.1r)**	**4680 (17.3.1)**	**26**
C8200L-1N-4T (4 GB)	**1500 (17.5.1)**	**250 (17.5.1)**	**2**
C8200-1N-4T (8 GB)	**2500 (17.4.1)**	**450 (17.4.1)**	**3**
C8300-1N1S-6T (8 GB)	**7000 (17.3.2)**	**1000 (17.3.2)**	**6**
C8300-2N2S-6T (8 GB)	**7500 (17.3.2)**	**1000 (17.3.2)**	**6**
C8300-1N1S-4T2X (8 GB)	**8000 (17.3.2)**	**1200 (17.3.2)**	**7**
C8300-2N2S-4T2X (16 GB)	**10000 (17.3.2)**	**2500 (17.3.2)**	**14**
C8000V-S/CSR1Kv – 1 vCPU[1] (4 GB)	1000	150	1
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	3000	500	3
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	6000	540	3

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls SHA1_80 – GCM128 sRTP(G711) – sRTP(G711)	CPS
ASR1001-X (16 GB)	12000	1000	6
ASR1002-X (16 GB)	14000	3000	16
ASR1004/6/6-X RP2/ESP40 (16 GB)	16000	1500	9

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls SHA1_80 – GCM256 sRTP(G711) – sRTP(G711)	CPS
1100 series (Default DRAM)	500	150	1
4321 (4 GB)	500	150	1
4331 (4 GB)	1000	300	2
4351 (4 GB)	2000	375	2
4431 (8 GB)	3000	375	2
4451 (8 GB)	6000	540	3
4461 (8 GB)	**10000 (17.2.1r)**	**4680 (17.3.1)**	**26**
C8200L-1N-4T (4 GB)	**1500 (17.5.1)**	**250 (17.5.1)**	**2**
C8200-1N-4T (8 GB)	**2500 (17.4.1)**	**450 (17.4.1)**	**3**
C8300-1N1S-6T (8 GB)	**7000 (17.3.2)**	**1000 (17.3.2)**	**6**
C8300-2N2S-6T (8 GB)	**7500 (17.3.2)**	**1000 (17.3.2)**	**6**
C8300-1N1S-4T2X (8 GB)	**8000 (17.3.2)**	**1200 (17.3.2)**	**7**
C8300-2N2S-4T2X (16 GB)	**10000 (17.3.2)**	**2500 (17.3.2)**	**14**
C8000V-S/CSR1Kv - 1 vCPU[1] (4 GB)	1000	150	1
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	3000	500	3
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	6000	540	3

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	Encrypted Audio calls SHA1_80 – GCM256 sRTP(G711) – sRTP(G711)	CPS
ASR1001-X (16 GB)	12000	1000	5
ASR1002-X (16 GB)	14000	2500	14
ASR1004/6/6-X RP2/ESP40 (16 GB)	16000	1500	8

CUBE Encrypted IPT Session Capacity (IOS-XE 16.12+)

Platform	Session Capacity (IOS-XE 17.2.1r) RTP(G711)-RTP(G711)	Encrypted Audio GCM128 – GCM128 GCM128 – GCM256 GCM256 – GCM256 sRTP(G711) - sRTP(G711)	CPS
4461 (8 GB)	10000 (17.2.1r)	2700 (17.3.1)	15
C8300-1N1S-6T (8 GB)	7000 (17.3.2)	900 (17.3.2)	5
C8300-2N2S-6T (8 GB)	7500 (17.3.2)	1050 (17.3.2)	6
C8300-1N1S-4T2X (8 GB)	8000 (17.3.2)	1150 (17.3.2)	7
C8300-2N2S-4T2X (16 GB)	10000 (17.3.2)	2400 (17.3.2)	14

Collab Calls –

Encrypted Video Calls

- SRTP–RTP
- SRTP–SRTP

CUBE Encrypted Video Session Capacity

[H.264 QCIF (15 FPS, 64 kbps)] - (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Encrypted video calls w/SHA1_80 sRTP(G711)-RTP(G711)	CPS	Encrypted video calls w/GCM128 sRTP(G711)-RTP(G711)	CPS
1100 series (Default DRAM)	100	1	50	1
4321 (4 GB)	100	1	50	1
4331 (4 GB)	180	1	100	1
4351 (4 GB)	180	1	120	1
4431 (8 GB)	180	1	100	1
4451 (8 GB)	540	3	180	1
C8200L-1N-4T (4 GB)	130	1	80	1
C8200-1N-4T (8 GB)	220	2	180	1
C8000V-S/CSR1Kv - 1 vCPU[1] (4 GB)	180	1	180	1
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	180	1	540	1
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	540	3	540	3
ASR1001-X (16 GB)	900	5	360	2
ASR1002-X (16 GB)	2300	13	900	5
ASR1004/6/6-X RP2/ESP40	1250	7	540	3

CUBE Encrypted Video Session Capacity

[H.264 QCIF (15 FPS, 64 kbps)] – (IOS-XE 16.12+)

Platform [1]CSR1Kv – Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Encrypted video calls w/GCM256 sRTP(G711)–RTP(G711)	CPS	Encrypted Video calls SHA1_80 – GCM128 sRTP(G711) – sRTP(G711)	CPS
1100 series (Default DRAM)	50	1	50	1
4321 (4 GB)	50	1	50	1
4331 (4 GB)	100	1	100	1
4351 (4 GB)	110	1	130	1
4431 (8 GB)	100	1	115	1
4451 (8 GB)	180	1	180	1
C8200L-1N-4T (4 GB)	80	1	80	1
C8200-1N-4T (8 GB)	140	1	140	1
C8000V-S/CSR1Kv – 1 vCPU[1] (4 GB)	180	1	180	1
C8000V-M/CSR1Kv – 2 vCPU[1] (4 GB)	180	1	180	1
C8000V-L/CSR1Kv – 4 vCPU[1] (8 GB)	540	3	180	1
ASR1001-X (16 GB)	360	2	360	2
ASR1002-X (16 GB)	900	5	900	5
ASR1004/6/6-X RP2/ESP40	540	3	540	3

CUBE Encrypted Video Session Capacity
[H.264 QCIF (15 FPS, 64 kbps)] – (IOS-XE 16.12+)

Platform [1]CSR1Kv – Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Encrypted Video calls SHA1_80 – GCM256 sRTP(G711) – sRTP(G711)	CPS
1100 series (Default DRAM)	50	1
4321 (4 GB)	50	1
4331 (4 GB)	100	1
4351 (4 GB)	130	1
4431 (8 GB)	115	1
4451 (8 GB)	180	1
C8200L-1N-4T (4 GB)	80	1
C8200-1N-4T (8 GB)	140	1
C8000V-S/CSR1Kv – 1 vCPU[1] (4 GB)	180	1
C8000V-M/CSR1Kv – 2 vCPU[1] (4 GB)	180	1
C8000V-L/CSR1Kv – 4 vCPU[1] (8 GB)	180	1
ASR1001-X (16 GB)	360	2
ASR1002-X (16 GB)	900	5
ASR1004/6/6-X RP2/ESP40	540	3

Contact Center Calls
(UCCE/PCCE)

CUBE Session Capacity for UCCE (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	UCCE Capacity (Prior to IOS-XE 16.12)	UCCE Call Capacity RTP(G711)-RTP(G711) (IOS-XE 16.12+)	Impact of UCCE to IPT (Collab)	UCCE CPS
1100 series (Default DRAM)*	500	N/A	500	0%	5
4321 (4 GB)	500	125	500	0%	3
4331 (4 GB)	1000	250	1000	0%	7
4351 (4 GB)	2000	500	1500	25%	8
4431 (8 GB)	3000	750	1800	40%	10
4451 (8 GB)	6000	1500	3600	40%	20
4461 (8 GB)	10000 (17.2.1r)	N/A	4680 (17.2.1r)	53%	26
C8200L-1N-4T (4 GB)*	1500 (IOS-XE 17.5.1+)	N/A	1000	33%	6
C8200-1N-4T (8 GB)*	2500 (IOS-XE 17.4.1a+)	N/A	1400	44%	8
C8300-1N1S-6T (8 GB)*	7000 (17.3.2)	N/A	3200 (17.3.2)	54%	18
C8300-2N2S-6T (8 GB)*	7500 (17.3.2)	N/A	3700 (17.3.2)	51%	21
C8300-1N1S-4T2X (8 GB)*	8000 (17.3.2)	N/A	3800 (17.3.2)	52.5%	21
C8300-2N2S-4T2X (16 GB)*	10000 (17.3.2)	N/A	4100 (17.3.2)	59%	23

* Check Contact Center Enterprise Solution Compatibility matrix for supported CUBE platforms and software releases.

CUBE Session Capacity for UCCE (IOS-XE 16.12+)

Platform [1]CSR1Kv - Based on tests using Cisco UCS ® C240 host with Intel ® Xeon ® 6132 2.60GHz processors running VMware ESXi 6.0.	Session Capacity (IOS-XE 16.12+) RTP(G711)-RTP(G711)	UCCE Capacity (Prior to IOS-XE 16.12)	UCCE Call Capacity RTP(G711)-RTP(G711) (IOS-XE 16.12+)	Impact of UCCE to IPT (Collab)	UCCE CPS
C8000V-S/CSR1Kv – 1 vCPU[1] (4 GB)	1000	250	500	50%	3
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	3000	750	3000	0%	20
C8000V-L/CSR1Kv - 4 vCPU[1] (8 GB)	6000	1500	4250	29%	24
ASR1001-X (16 GB)	12000	3000	4250	65%	24
ASR1002-X (16 GB)	14000	3500	4250	70%	24
ASR1004/6/6-X RP2/ESP40 (16 GB)	16000	4000	4500	72%	25

Sample ISR4K CUBE Sizing

- An enterprise is considering a 4451-X for their collab deployment with the following requirements:
  - 500 Unencrypted IPT calls
  - 100 Contact Center (CC) calls
  - Record all CC calls = 100 IPT Calls
  - 50 SRTP-RTP audio calls with SHA1-80
  - 100 SRTP-SRTP audio calls

TOTAL CUBE Trunk Session Licenses Required in this setup:
500+100+50+100 = **750**

4451 6000 IPT Calls	Ratio to IPT calls	%age IMPACT
IPT Calls	1	N/A
UCCE	1.67	40%
Recorded legs	1.0	50%
SRTP-RTP	2.86	65%
SRTP-SRTP	11.11	91%

500 Unencrypted IPT calls * 1.00 = **500**
\+ 100 Contact Center calls * 1.67 = **167**
\+ Record all CC calls = 100 IPT Calls * 1.00 = **100**
\+ 50 SRTP-RTP audio calls with SHA1-80 * 2.86 = **143**
\+ 100 SRTP-SRTP audio calls * 11.11 = **1111**

TOTAL Capacity in terms of IPT count = 2021

4451-X

CUBE Media Proxy Capacities

Media Proxy: Capacity for Various Platforms (IOS-XE 16.12+)

Platform	Max IPT Calls	(Media Proxy Capacity CUCM NBR) Number of Recorders				
		One	Two	Three	Four	Five
1100 (Default DRAM) / 4321 (4GB)	500			350		
4331 (4GB)	1000			700		
4351 (4 GB)	2000			900		
4431 (8 GB - CP)	3000			1000		
4451 (8 GB - CP)	6000			3000		
4461 (8 GB – CP) [IOS 17.2.1]	10000			4000		
C8000V-S/CSR1Kv – 1 vCPU[1] (4 GB)	1000			90		
C8000V-M/CSR1Kv - 2 vCPU[1] (4 GB)	3000			1100		
C8200L-1N-4T (17.5.1+) (4 GB)	1500			600		
C8200-1N-4T (8 GB) (17.4.1a)	2500			1000		
C8300-1N1S-6T (8 GB) (17.3.2)	7000			3000		
C8300-2N2S-6T (8 GB) (17.3.2)	7500			3400		
C8300-1N1S-4T2X (8 GB) (17.3.2)	8000			3400		
C8300-2N2S-4T2X (16 GB) (17.3.2)	10000			3600		

Media Proxy: Capacity for Various Platforms (IOS-XE 16.12+)

Platform	Max IPT Calls	(Media Proxy Capacity CUCM NBR) Number of Recorders				
		One	Two	Three	Four	Five
ASR 1002-X (16 GB)	14000			4500		
ASR 1004/6/6-X RP2/ESP40 (16 GB)	16000			4500		

Media Proxy: Capacity for Various Platforms (IOS-XE 16.12+)

Platform	Max IPT Calls	(Media Proxy Capacity SIPREC) Number of Recorders				
		One	Two	Three	Four	Five
4321 (4GB)	500			180		90
4331 (4GB)	1000			550		350
4351 (4 GB)	2000			650		350
4431 (8 GB - CP)	3000			750		550
4451 (8 GB - CP)	6000			1900		900
4461 (8 GB - CP) [IOS 17.2.1]	10000			3600		1950
C8200L-1N-4T (4 GB) (17.5.1+)	1500			450		300
C8200-1N-4T (8 GB) (17.4.1a)	2500			750		600
C8300-1N1S-6T (8 GB) (17.3.2)	7000			2100		1300
C8300-2N2S-6T (8 GB) (17.3.2)	7500			2100		1300
C8300-1N1S-4T2X (8 GB) (17.3.2)	8000			2700		1600
C8300-2N2S-4T2X (16 GB) (17.3.2)	10000			3900		1950
ASR 1001-X/1002-X (16 GB)	14000			4000		2800
ASR 1004/6/6-X RP2/ESP40 (16 GB)	16000			4000		3200
ASR 1006-X RP3/ESP100 (16 GB)	16000			3400		3000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