Tested by WIPRO

Compatible with Skype for Business Server for Infrastructure

Enhanced Gateway Interoperability Testing

Submitted by Media5 Corporation

Mediatrix Gateways Series:

Sentinel, G7, C7, S7, S7 LP, 4100, LP, 3000, and 4400

Test Dates: 18th August to 11th October 2017

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1. Executive Summary

Wipro team carried out the Skype for Business interoperability tests for "Media5 Corporation" Enhanced Gateway at our test facility in Bellevue, WA, USA with support from Hyderabad, India. Wipro has carried out the Skype for Business Interoperability Enhanced Gateway tests for compliance & uncovering any other usability issues.

Wipro team thanks Media5 Corporation for providing this opportunity.

This document captures the details of the product/service that were used for the testing, test procedures used and the summary of the test results.

2. Partner Details

	Product	Media5 Corporation
Partner	**Device Models**	Mediatrix Sentinel series, G7 series, S7 series, C7 series, LP series, 4100 series, 4400 series, 3000 series
	Firmware Version	Dgw2.0.40.747
	Platform	Skype for Business Server
	Version	6.0.9319.281

3. Enhanced Gateway Test Topology
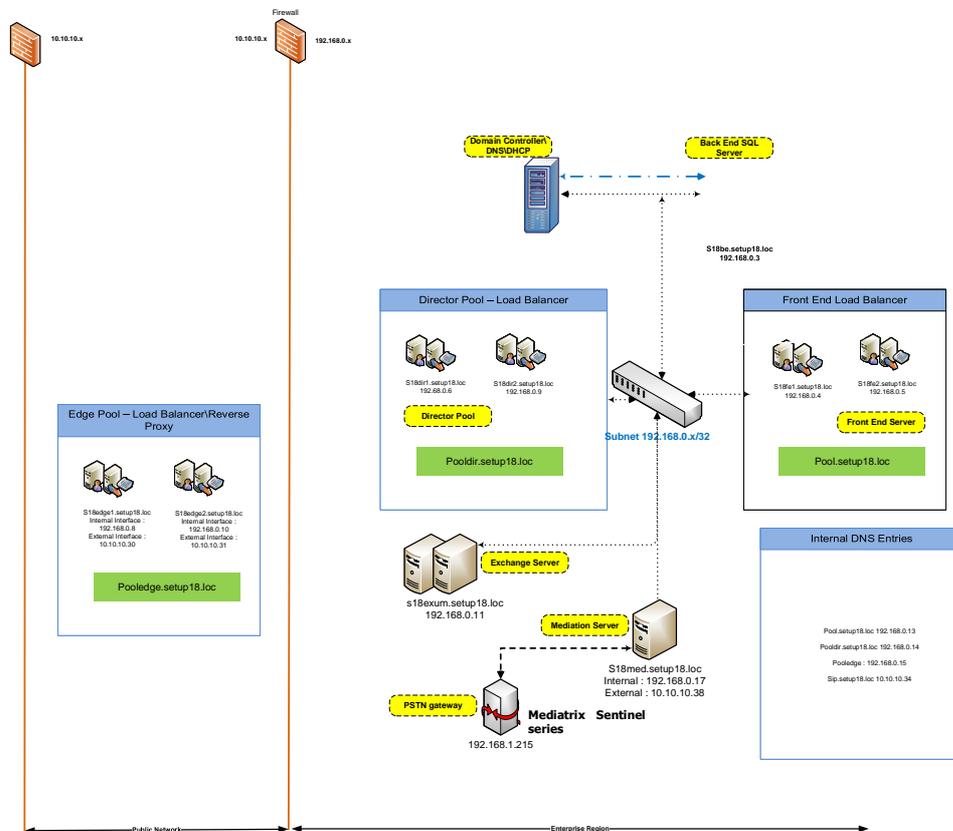
4. Verification Test Procedure

- Wipro performed the verification tests of Enhanced Gateway utilizing information made available through TechNet the "**TDS_SfB_Server_2015_Infrastructure_Interoperability_ Program_for_Gateway.docx**" by Microsoft Corporation. This Verification program has been formulated and is governed by Wipro Ltd.
- Mediatrix Sentinel series, G7 series, S7 series, C7 series, LP series, 4100 series, 4400 series, 3000 series sharing the same firmware version.

5. Tools

1. Snooper – Skype for Business Server's logging tool
2. ACSYSLOG server
3. Skype Logging tool – to validate the SIP call flow at Skype for Business end.
4. Wireshark – to validate the SIP/call flow between Skype & SPP
5. Network Monitor – to validate TURN and STUN signals in Edge Server

6. Test Summary

Overall Scenarios for Enhanced Gateway

	Count
Total test cases	139
Pass	136
Fail	0
Not Tested	0
Not Applicable	0
Not Supported	3
Total Pending	**0**

7. Test Results

	TestCase ID	Feature & Description	Status
3.2		**Basic Verification Test**	
3.2.1	404891	Skype for Business Client receives a call from PSTN End Point with G.711 A-law and/or G.711 U-law codecs	Pass
3.2.2	404895	PSTN End Point places a call from Skype for Business Client on hold for 15 minutes and then resumes	Pass
3.2.3	404892	3.2.3 PSTN End Point1 calls Skype for Business Client that forwards the call to PSTN End Point2	Pass
3.2.4	404896	PSTN End Point calls Skype for Business Client1 that performs Blind Transfer to Skype for Business Client2 with REFER	Pass
3.2.5	404893	PSTN End Point1 calls Skype for Business Client that escalates the call to a conference by inviting PSTN End Point2	Pass
3.2.6	404894	Device fails over incoming call to Mediation Server2 when Mediation Server1 sends 503 Service Unavailable response	Pass
4		**Basic Call Features**	
4.1		**Codes**	
4.1.1	404631	Device negotiates Comfort Noise in a call from Skype for Business Client to PSTN End Point	Pass
4.1.2	404645	Device offers DTMF payload type in the range of 96-127 to Mediation Server	Pass
4.1.3	404632	Device sends Comfort Noise packets to Skype for Business Client when a call is muted	Pass

4.1.4	404633	Device sends Comfort Noise packets to Skype for Business Client when secure call is muted	**Pass**
4.1.5	404636	Skype for Business Client is able to establish a call with PSTN End Point using G.711 A-law codec	**Pass**
4.1.6	404630	Skype for Business Client makes a call to PSTN End Point with G.711 A-law and/or G.711 U-law codecs	**Pass**
4.1.7	404658	Skype for Business Client makes a call to PSTN End Point with G.711 U-law codec	**Pass**
4.1.8	404663	Skype for Business Client receives a call from PSTN End Point with G.711 U-law codecs	**Pass**
4.1.9	404664	Skype for Business Client receives a secure call with G.711 U-law codec with Media Bypass OFF	**Pass**
4.1.10	404634	PSTN End Point is able to establish a call with Skype for Business Client using G.711 A-law codec	**Pass**
4.1.11	404635	PSTN End Point is able to establish a secure call with Skype for Business Client using G.711 A-law codec	**Pass**
4.2		**RTP-RTCP**	
4.2.1	404647	Device may send RTCP sender and receiver reports	**Pass**
4.2.3	404641	Device sends RTCP packets when Skype for Business Client places call on hold	**Pass**
4.2.4	404672	Device sends RTCP packets while playing music on hold	**Pass**
4.2.5	404649	Device sends SRTCP sender and receiver reports for a secure call	**Pass**
4.3		**Basic Call features**	
4.3.1	404609	Device correctly handles non-E.164 number in outbound Request URI	**Pass**
4.3.2	404653	Device disconnects a forked call if PSTN End Point hangs up while phones are ringing	**Pass**
4.3.4	404654	Device disconnects a forked secure call if PSTN End Point hangs up while phones are ringing	**Pass**
4.3.6	404648	Device does not change the SSRC of an established inbound RTP session	**Pass**
4.3.7	404670	Device does not change the SSRC of an established inbound SRTP session	**Pass**
4.3.8	404644	Device does not change the SSRC of an established outbound RTP session	**Pass**
4.3.9	404667	Device does not change the SSRC of an established outbound SRTP session	**Pass**
4.3.10	404629	Device establishes call to Skype for Business Client with configured value of ptime	**Pass**
4.3.11	404622	Device handles call from Mediation Server with an alias name in the FROM header	**Pass**
6.5.1	404637	Device handles multiple RTP streams for a call to Skype for Business Client	**Pass**
4.3.13	404638	Device handles multiple SRTP streams for a secure call to Skype for Business Client	**Pass**
6.6.1	404619	Device is able to disconnect a call that is forked to Skype for Business Clients set to 'Do not disturb'	**Pass**
4.3.15	404617	Device processes call from Skype for Business Client with E.164 number in FROM Header URI	**Pass**
4.3.16	404615	Device processes phone-context in Request and To URI from Skype for Business Client	**Pass**
4.3.17	404662	Device sends its own FQDN in contact header for TLS call from Skype for Business Client to PSTN End Point	**Pass**
4.3.18	404656	Device sends PRACK for reliable Early Media for a call from PSTN End Point to Skype for Business Client	**Pass**
4.3.20	404657	Device sends PRACK for reliable Early Media for call from PSTN End Point to Skype for Business Client with SRTP Optional	**Not Supported**
4.3.21	404620	Device sends single media description line for a call from PSTN End Point to Skype for Business Client	**Pass**
4.3.22	404660	Device that supports SRTP only rejects call from Skype for Business Client that supports RTP Only	**Pass**
4.3.23	404643	Device with RTP only setting rejects call from Skype for Business Client that requires SRTP	**Pass**

4.3.24	404610	Skype for Business Client calls PSTN End Point and hangs up before receiving 200 OK from Device	Pass
4.3.25	404606	Skype for Business Client calls PSTN End Point with a call duration longer than 32 seconds	Pass
4.3.26	404621	Skype for Business Client calls an IVR number and navigates through the IVR menu after call connection	Pass
4.3.27	404608	Skype for Business Client calls IVR number and navigates through the IVR menu before call Connection	Pass
4.3.28	404650	Skype for Business Client hears Early Media for a call to PSTN End Point	Pass
4.3.29	404651	Skype for Business Client hears Early Media for a secure call to PSTN End Point	Pass
4.3.30	404652	Skype for Business Client hears Early Media for a secure call to PSTN End Point when Media Bypass OFF	Pass
4.3.31	433136	Skype for Business Client makes a secure call to an IVR and pastes a string of conference ID digits which are recognized by the Device and IVR	Pass
4.3.32	404618	Skype for Business Client response to PSTN End Point is delayed due to network delay	Pass
4.3.33	404616	Skype for Business Client sends INVITE with E.164 number and extension in Request and To URI	Pass
4.3.34	404627	Skype for Business Client1 calls PSTN End Point, Skype for Business Client1 parks the call and retrieves it on Skype for Business Client2	Pass
4.3.35	404625	Mediation Server renegotiates an existing voice session with a different IP address	Pass
4.3.36	404614	PSTN End Point calls Skype for Business Client and hangs up while Skype for Business Client is still ringing	Pass
4.3.37	404628	PSTN End Point calls Skype for Business Client that later parks the call but does not retrieve it	Pass
4.3.39	404626	PSTN End Point calls Skype for Business Client1, Skype for Business Client1 parks the call and retrieves it on Skype for Business Client2	Pass
4.3.41	404613	PSTN End Point disconnects established call from Skype for Business Client	Pass
4.3.42	404612	PSTN End Point disconnects established call to Skype for Business Client	Pass
4.3.43	404611	PSTN End Point displays Skype for Business Client Caller ID for Outbound Call	Pass
4.3.44	404623	PSTN End Point1 calls Skype for Business Client that is set to simultaneous ring to Skype for Business Client and PSTN End Point2 answers	Pass
4.3.46	404655	PSTN End Point1 calls Skype for Business Client that is set to simultaneous ring to IVR number on a PSTN endpoint	Pass
4.3.47	404624	Inbound call to Skype for Business Client from PSTN End Point with a very long Request-URI in the INVITE	Pass
4.5		**TLS-SRTP**	
4.5.1	404671	Device adds at least one "crypto" attribute for each media description line in the SDP	Pass
4.5.2	404668	Device sends Crypto attributes in SDP for call from PSTN End Point to Skype for Business Client	Pass
4.5.3	404673	Skype for Business Client makes a secure call to PSTN End Point	Pass
4.5.4	404666	Skype for Business Client makes a secure call to PSTN End Point and PSTN End Point later hangs up	Pass
4.5.5	404674	Skype for Business Client makes a secure call to PSTN End Point with call duration more than 32 seconds and SRTP set to Optional	Not Supported
4.5.6	404642	Skype for Business Client makes a secure call to an IVR number and navigates through the IVR menu after receiving 200 OK from Device	Pass
4.5.7 S	428534	Skype for Business Client places a secure call to PSTN End Point and call is up for more than 30 minutes with session timer enabled on Device	Pass

4.5.8	439172	Skype for Business Client places a secure call to PSTN End Point and call is up for more than 30 minutes with session timer enabled on Device (Media Bypass OFF)	Pass
4.5.9	404659	Mediation Server that requires SRTP rejects call from Device that supports RTP only	Pass
4.5.10	404669	PSTN End Point calls Skype for Business Client with security enabled and Skype for Business Client later hangs up	Pass
4.6		**Pool Certificates**	
4.6.1	404826	Device accepts Mediation Server 'pool' certificate for a secure call	Pass
4.6.2	428357	Device offers Device pool certificate for a secure call	Pass
5		**Hold-Resume**	
5.1		**Device Initiated Hold**	
5.1.1	404769	PSTN End Point places a call to Skype for Business Client on hold for 15 minutes and then resumes (Media Bypass OFF)	Pass
5.1.2	404779	PSTN End Point places a secure call from Skype for Business Client on hold and then resumes	Pass
5.1.3	404768	PSTN End Point places a secure call to Skype for Business Client on hold and resumes after 15 minutes	Pass
5.2		**Music on Hold (MOH)**	
5.2.1	404775	Skype for Business Client plays music when it holds call from PSTN End Point to Skype for Business Client	Pass
5.2.2	404771	Skype for Business Client resumes call to PSTN End Point after playing music on hold for 15 minutes	Pass
5.3		**Server Initiated Hold**	
5.3.1	404766	Device disconnects a call that is on hold when Skype for Business Client hangs up	Pass
5.3.2	404767	Device disconnects a call that is on hold when PSTN End Point hangs up	Pass
5.3.3	404778	Skype for Business Client places a call from PSTN End Point on hold for 15 minutes and then resumes	Pass
5.3.4	404773	Skype for Business Client places a call to PSTN End Point on hold and resumes after 12 minutes	Pass
5.3.5	428503	Skype for Business Client places secure call to PSTN End Point on hold after 30 minutes and then resumes	Pass
5.3.6	439166	Skype for Business Client places secure call to PSTN End Point on hold after 30 minutes and then resumes (Media Bypass OFF)	Pass
6		**Call Forward**	
6.1.1	404751	PSTN End Point1 calls Skype for Business Client that forwards all calls to PSTN End Point2 when Media Bypass OFF	Pass
6.1.2	404750	PSTN End Point1 makes a secure call to Skype for Business Client that forwards the call to PSTN End Point2 with Media Bypass OFF	Pass
6.1.3	404749	PSTN End Point1 makes a secure call to Skype for Business Client that has call forwarded to PSTN End Point2	Pass
7		**Transfer**	
7.1		**Blind Transfer**	
7.1.1	404802	Device generates INVITE with Replaces and Referred-By headers when it receives a REFER request	Pass
7.1.2	404803	Device maintains the original session when rejecting a call transfer with REFER	Pass
7.1.3	404801	Device supports Hairpin Elimination for Blind Transfer with REFER	Pass
7.1.4	404804	Device supports Hairpin Elimination for secure Blind Transfer with REFER	Pass
7.1.6	404799	PSTN End Point1 calls Skype for Business Client and Skype for Business Client Blinds Transfers the call to PSTN End Point2	Pass
7.1.7	404800	PSTN End Point1 makes a secure call to Skype for Business Client and Skype for Business Client Blinds Transfers the call to PSTN End Point2	Pass
7.2		**Consultative Transfer**	
7.2.1	404807	Device does not drop the call when Consultative Transfer by Skype for Business Client to second PSTN End Point fails	Pass

7.2.2	404798	Device includes REFER in ALLOW header in INVITE sent to Mediation Server	**Pass**
7.2.3	404808	Device supports Hairpin Elimination for Consultative Transfer with REFER	**Pass**
7.2.4	404809	Device supports Hairpin Elimination for secure Consultative Transfer with REFER	**Pass**
7.2.5	404805	PSTN End Point1 calls Skype for Business Client and Skype for Business Client Consultative Transfers to PSTN End Point2	**Pass**
7.2.6	404806	PSTN End Point1 makes a secure call to Skype for Business Client and Skype for Business Client Consultative Transfers to PSTN End Point2	**Pass**
8		**Conference**	
8.1		**Conference Auto Attendant (CAA)**	
8.1.1	404758	PSTN End Point establishes a call with the Conference Auto Attendant	**Pass**
8.2		**Conference Escalation**	
8.2.1	404757	Skype for Business Client1 calls Skype for Business Client2 and escalates the call to a conference, inviting PSTN End Point and later removing it	**Pass**
9		**Load Balancing and Failover**	
9.1		**SIP OPTIONS Ping**	
9.1.1	404830	Device responds to OPTIONS as keep alive to Mediation Server over TCP	**Pass**
9.1.2	404832	Device responds to OPTIONS as keep alive to Mediation Server over TLS	**Pass**
9.1.3	404833	Device resumes sending calls to Mediation Server when it starts receiving OPTIONS response from that Mediation Server	**Pass**
9.1.4	404831	Device sends periodic OPTIONS message as keep alive to Mediation Server	**Pass**
9.2		**DNS Load Balancing**	
9.2.1	404829	Device uses load balancing to distribute secure inbound calls among Mediation Servers in a cluster	**Pass**
9.2.2	404853	Device distributes new calls among DNS configured Mediation Servers	**Pass**
9.2.3	404855	Device honors TTL when distributing new calls among DNS configured Mediation Servers	**Pass**
9.3		**Failover and Routing**	
9.3.1	404835	PSTN End Point establishes a call with Skype for Business Client when interface of Mediation Server1 goes down	**Pass**
9.3.2	404837	Device fails over incoming call to a second Mediation Server when the first Mediation Server does not respond	**Pass**
9.3.3	404850	Device utilizes failover and does not offer new calls to a failed Mediation Server	**Pass**
10		**Analog**	
10.1		**Basic Calls**	
10.1.1	404588	Call between two Analog End Points on the same Device transferred to a Skype for Business Client	**Pass**
10.1.3	404587	Call from Skype for Business Client1 to Analog End Point transferred to another Skype for Business Client2	**Pass**
10.1.4	404584	Call Hold-Resume between two Analog End Points on different Devices	**Pass**
10.1.5	404585	Call Hold-Resume for an outbound call from Skype for Business Client to Analog End Point	**Pass**
10.1.6	404586	Consultative Transfer from Analog End Point to Skype for Business Client2 by Skype for Business Client1	**Pass**
10.1.8	404583	Fax call flows between two Analog End Points on the same Device	**Pass**
10.1.10	404580	Inbound call from a PSTN End Point to Analog End Point	**Pass**
10.1.12	404582	Outbound call from an Analog End Point associated with a Device to a PSTN End Point	**Pass**
10.1.14	404578	Voice call between two Analog End Points on different Devices	**Pass**
11		**Anonymous Caller Representation**	
11.1		**Inbound Anonymous Caller Representation**	
11.1.1	404602	PSTN End Point calls Skype for Business Client with Caller ID set to 'Anonymous' on Device	**Pass**

12		Mapping and Error Handling	
12.1		Mapping	
12.1.1	404865	Device disconnects call when Mediation Server sends 408 Request Timeout for call from PSTN End Point	Pass
12.1.2	404871	Device disconnects call when Mediation Server sends 501 Not Implemented for call from PSTN End Point	Pass
12.1.3	404872	Device disconnects call when Mediation Server sends 606 Not Acceptable for call from PSTN End Point	Pass
12.1.4	404869	Device generates 486 Busy Here response from a busy PSTN End Point	Pass
12.1.5	404607	Device generates 603 Decline response for a call rejected by PSTN End Point	Pass
12.1.6	404661	Device handles 488 Not Acceptable Here response from the Mediation Server operating in RTP only mode	Pass
12.1.7	404868	Device handles call from Skype for Business Client to a user that does not exist in the domain	Pass
12.1.8	404870	Device processes 486 Busy Here response from a busy Skype for Business Client	Pass
12.1.9	404861	Device processes 488 Not Acceptable Here response for unsupported codec from Mediation Server	Pass
12.1.10	404866	Device processes 603 Decline from Skype for Business Client for a secure call	Pass
12.1.11	404867	Device processes 603 Decline response from Skype for Business Client	Pass
12.1.12	404864	Device rejects call from Skype for Business Client to PSTN End Point when the associated PRI line is down	Pass
12.1.13	404873	Device responds with 488 Not Acceptable Here when Mediation Server offers a codec unsupported on the device	Pass
12.1.14	404859	Device sends 414 Request-URI Too Long when unable to handle very long Request URI	Not Supported
12.1.15	438958	Reason headers are included for all 4xx, 5xx and 6xx responses	Pass
12.1.16	438948	Reason headers are included for all BYE requests	Pass
12.1.17	438953	Reason headers are included for all CANCEL requests	Pass

8. Exception \ Limitation

- Crypto attributes:
  Device does not advertise crypto attributes in SDP. As per design, SRTP and SRTCP packet lifetime are set to 2^48 and 2^31 packets respectively
- Long Request URI:
  Media5 gateways have no limitation on the length of the SIP URI.
  Our product supports very well longer URIs.
  This is to ensure our gateways are compatible with the widest variety of third party SIP products.
- SRTP Optional:
  Media5 gateways support either secure (SRTP) or unsecure (RTP) media transports. Media5 recommends using secure connections over "optional SRTP" connections where the security level of a given connection cannot be determined in advance.

Impacted Scenarios with the above Limitation

TestCase ID	Feature & Description	Status
404657	Device sends PRACK for reliable Early Media for call from PSTN End Point to Skype for Business Client with SRTP Optional	Not Supported
404668	Device sends Crypto attributes in SDP for call from PSTN End Point to Skype for Business Client	Pass

404674	Skype for Business Client makes a secure call to PSTN End Point with call duration more than 32 seconds and SRTP set to Optional	Not Supported
404859	Device sends 414 Request-URI Too Long when unable to handle very long Request URI	Not Supported

9. Gateway Model

This Verification is valid to all the Gateway Models mentioned below and using the same firmware "Dgw2.0.40.747".

a. Mediatrix Sentinel 400

Sentinel 400 enables SIP Trunking and Unified communications in a multi service business platform bundling Media Gateway capabilities.

b. Mediatrix Sentinel 100

Sentinel 100 is a multi-service VoIP platform combining VoIP IAD, Gateway, IP Router, NAT/Firewall, and more with great flexibility and reliability.

c. Mediatrix G7 Series

Combines Analog Adaptor and Gateway capabilities to connect TDM PBX to cloud telephony services and IP PBX systems to PSTN landlines. Learn more

d. Mediatrix S7 Series

The Mediatrix S7 rich feature set, including outstanding voice quality and mass management, enables users to fully benefit from the IP communications. Learn more

e. Mediatrix S7 LP Series

Industry leading resiliency for deploying cloud telephony services for regions and cabling with over-voltage exposure.

f. Mediatrix C7 Series

A flexible combination of FXS and FXO interfaces in a simple platform to interconnect remote offices with the headquarters through SIP based networks.

g. Mediatrix 4100 Series

Analog VoIP Adaptors for a smooth integration of legacy telephones, faxes, and modems into SIP based networks.

h. Mediatrix 4400 Series

Cost effective BRI media gateways to connect legacy PBXs and PSTN lines to SIP based networks.

i. Mediatrix LP Series

Provides lightning protection and enhanced power feeding to meet requirements of large buildings and outdoor deployments.

j. Mediatrix 3000 Series

VoIP gateway series to integrate legacy PBX systems and PSTN local access into IP-based telephony systems.

10.   Conclusion

For the Infrastructure partner **Media5 Corporation,** the Enhanced Gateway test pass has been completed successfully on Skype for Business On-premise. Wipro team executed all the tests in the topology.

Wipro team thanks the Media5 Corporation for the support extended during the Enhanced Gateway test pass and look forward to conduct more verification tests in future.

11.   References

- **TDS_SfB_Server_2015_Infrastructure_Interoperability_ Program_for_Gateway.docx**

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