Anexa: Specificatii Tehnice de Testare

1. Generalitati

1.1 Scopul acestei anexe este de a preciza setul de teste ce trebuie efectuate si incheiate cu succes pentru validarea Legaturilor de interconectare IP, respectiv a serviciilor reglementate de prezentul acord.

1.2 Fiecare serviciu reglementat de prezentul acord va fi testat separat, odata cu infrastructura asociata.

1.3 Testele sunt impartite in grupe functionale pentru a permite validarea fiecaruia dintre sistemele implicate in procesul de Interconectare IP:

a. Teste de validare a suportului de transmisiuni
b. Teste de validare a interoperabilitatii SIP
c. Teste de rutare
d. Teste de taxare

1.4 Testele vor fi considerate incheiate cu succes in conformitate cu recomandarile GSMA IR.87 relevante mentionate in in tabelele de mai jos.

1.5 Fiecare sesiune de testare asociata unei categorii de teste se va finaliza prin confirmarea Partilor care indica daca testele au fost sau nu realizate cu succes. In caz de esec, se va mentiona care Parte urmeaza sa efectueze o serie de corectii in vederea remedierii erorilor detectate in procesul de testare si totodata data la care aceste corectii sunt efectuate.

1.6 Fiecare categorie de teste asa cum este identificata in art. 1.3 va putea fi repetata o singura data, in cazul in care nu a fost incheiata cu succes prima sesiune de testare corespunzatoare, din cauze imputabile Operatorului.

1.7 Ulterior, daca cele 2 sesiuni de testare corespunzatoare unei categorii de teste, au esuat din cauze imputabile Operatorului, reprogramarea unei sesiuni suplimentare de testare se va face la maxim 15 zile lucratoare de la incheierea sesiunii anterioare de testare.

1.8 Trecerea la o categorie noua de teste se va putea efectua in conditiile in care categoria anterioara de teste a fost incheiata cu succes.

1.9 Interconectarea IP va putea deveni operationala in conditiile in care au fost trecute cu succes toate categoriile de teste.

1.10 Denumirea tuturor testelor din prezenta Anexa este pastrata in limba engleza pentru a evita traduceri nerelevante.

2. Organizarea testelor

In tabelul de mai jos sunt descrise, sumarizat, necesarul de teste ce vor trebui executate in functie de tipul activitatatii/proceselor identificate in cadrul unei relatii de Interconectare IP.

Tipul activitatii	Teste suport transmisiuni IP	Teste compatibilitate SIP	Teste rutare	Teste taxare
Interconectare IP initiala	da	da	da	da

Tipul activitatii	Teste suport transmisiuni IP	Teste compatibilitate SIP	Teste rutare	Teste taxare
Stabilirea unui nou PoI	da	da	da	da
Stabilirea unui nou PoA	da	da	da	da
Modificarea Capacitatii de Interconectare	da	-	-	da
Modificarea rutelor de voce	-	-	da	da
Implementare LURN	-	-	da	

3. Teste suport transmisiuni IP

Inainte de inceperea efectiva a testelor, Partile vor agrea in detaliu modul de desfasurare a acestora.

3.1 Network Connectivity

Test description	Verify SFP functionality
How	1. Connect SFP on port - show inventory 2. Configure IP address on each interface verified 3. Check interface status issuing “show interface” commands.
Expected results	Output should show expected configuration such as: # sh inventory NAME: "module mau GigabitEthernet0/0/CPU0/34", DESCR: "1000BASE-LX/LH SFP (DOM), SMF 10Km, MMF 550m" PID: SFP-GE-L, VID: V01 , SN: FNS13280FJZ #sh interfaces gi0/0/0/0 GigabitEthernet0/0/0/0 is up, line protocol is up [..] Internet address is 136.255.246.2/30 MTU 9100 bytes, BW 1000000 Kbit reliability 255/255, txload 7/255, rxload 6/255 Encapsulation ARPA, Full-duplex, 1000Mb/s, LX, link type is force-up output flow control is off, input flow control is off Carrier delay (up) is 10 msec loopback not set, ARP type ARPA, ARP timeout 04:00:00 Last clearing of "show interface" counters never 30 second input rate 26256000 bits/sec, 32031 packets/sec 30 second output rate 29510000 bits/sec, 34626 packets/sec 93081219375 packets input, 9528910220094 bytes, 0 total input drops 0 drops for unrecognized upper-level protocol Received 4 broadcast packets, 1713279 multicast packets 0 runts, 0 giants, 0 throttles, 0 parity 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort 94952959591 packets output, 10125259947844 bytes, 0 total output drops Output 25 broadcast packets, 1712901 multicast packets 0 output errors, 0 underruns, 0 applique, 0 resets 0 output buffer failures, 0 output buffers swapped out 0 carrier transitions

Test description	Verify used (for traffic) SFP functionality
How	1. Issue "ping" commands to each remote connected equipment 2. Check interface status for eah SFP
Expected results	Output should show expected configuration such as: #ping vrf VOIP 136.255.246.1 size 1500 donnotfrag count 10 Sending 10, 1500-byte ICMP Echos to 136.255.246.1 , timeout is 2 seconds: !!!!!!!!!! Success rate is 100 percent (10/10), round-trip min/avg/max = 1/1/2 ms #sh interfaces gi0/0/0/0 GigabitEthernet0/0/0/0 is up, line protocol is up Interface state transitions: 1 Dampening enabled: penalty 0, not suppressed half_life: 1 reuse: 750 suppress: 2000 max-suppress-time: 4 Hardware is GigabitEthernet/IEEE 802.3 interface(s), address is 001a.e3e9.a000 (bia 001a.e3e9.a000) Description: *** link 1 to Vodafone Interconnect *** Internet address is 136.255.246.2/30 MTU 9100 bytes, BW 1000000 Kbit reliability 255/255, txload 7/255, rxload 6/255 Encapsulation ARPA, Full-duplex, 1000Mb/s, LX, link type is force-up output flow control is off, input flow control is off Carrier delay (up) is 10 msec loopback not set, ARP type ARPA, ARP timeout 04:00:00 Last clearing of "show interface" counters never 30 second input rate 26256000 bits/sec, 32031 packets/sec 30 second output rate 29510000 bits/sec, 34626 packets/sec 93081219375 packets input, 9528910220094 bytes, 0 total input drops 0 drops for unrecognized upper-level protocol Received 4 broadcast packets, 1713279 multicast packets 0 runts, 0 giants, 0 throttles, 0 parity 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort 94952959591 packets output, 10125259947844 bytes, 0 total output drops Output 25 broadcast packets, 1712901 multicast packets 0 output errors, 0 underruns, 0 applique, 0 resets 0 output buffer failures, 0 output buffers swapped out 0 carrier transitions

Test description	Check routing protocol operation for each VRF
How	Issue command "show bgp vrf VOIP neighbor"
Expected results	Should see the expected neighbor count as established sh bgp vrf VPN neighbors BGP neighbor is 136.255.246.1, vrf VOIP Remote AS 12302, local AS 1, external link Description: TO_Vodafone_Interconnect Remote router ID 136.255.246.1 BGP state = Established, up for 00:00:18

Test description	Check routing protocol operation for each VRF
	NSR State: None Last read 00:00:18, Last read before reset 00:00:28 Hold time is 180, keepalive interval is 60 seconds Configured hold time: 180, keepalive: 60, min acceptable hold time: 3 Last write 00:00:13, attempted 126, written 126 Second last write 00:00:18, attempted 72, written 72 Last write before reset 00:00:23, attempted 126, written 126 Second last write before reset 00:00:28, attempted 72, written 72 Last write pulse rcvd before reset 00:00:22 Socket not armed for io, armed for read, armed for write Last write thread event before reset 00:00:22, second last 00:00:23 Last KA expiry before reset 00:00:00, second last 00:00:00 Last KA error before reset 00:00:00, KA not sent 00:00:00 Last KA start before reset 00:00:23, second last 00:00:00 Precedence: internet Non-stop routing is enabled Enforcing first AS is enabled Multi-protocol capability received Neighbor capabilities: Route refresh: advertised (old + new) and received (old + new) 4-byte AS: advertised and received Address family IPv4 Unicast: advertised and received Received 4 messages, 0 notifications, 0 in queue Sent 13 messages, 0 notifications, 0 in queue Minimum time between advertisement runs is 0 secs Inbound message logging enabled, 3 messages buffered Outbound message logging enabled, 3 messages buffered For Address Family: IPv4 Unicast BGP neighbor version 13 Update group: 0.2 Filter-group: 0.2 No Refresh request being processed Route refresh request: received 0, sent 0 Policy for incoming advertisements is PASS Policy for outgoing advertisements is PASS 0 accepted prefixes, 0 are bestpaths Cumulative no. of prefixes denied: 0. Prefix advertised 2, suppressed 0, withdrawn 0 Maximum prefixes allowed 1048576 Threshold for warning message 75%, restart interval 0 min An EoR was not received during read-only mode Last ack version 0, Last synced ack version 0 Outstanding version objects: current 1, max 1 Additional-paths operation: None Connections established 2; dropped 1 Local host: 136.255.246.2, Local port: 179, IF Handle: 0x00000000 Foreign host: 136.255.246.1, Foreign port: 31326 Last reset 00:00:20, due to Peer closing down the session Peer reset reason: Remote closed the session (Function not implemented) External BGP neighbor may be up to 3 hops away.

Test description	Check routing table for specific VRFs
How	Issue command "show route vrf VOIP"
Expected results	Routing table should be populated with dynamic and static entries EX: C 136.255.246.0/30 is directly connected, 00:25:57, GigabitEthernet0/0/0/1 L 136.255.246.2/32 is directly connected, 00:25:57, GigabitEthernet0/0/0/1 B 136.255.240.0/24 is directly connected, 00:24:51, GigabitEthernet0/0/0/1

Test description	Test igp redundancy in case of Primary router/link failure for VRF configured
How	1. log on to the Vodafone router 2. shutdown primary interface connected to Client 3. check BGP neighbor state 4. check RIB for VRF on router client
Expected results	The routing table should contain all routes in VRF. Connectivity to the Vodafone user plane IP addresses should be checked issuing ping commands, "show route vrf <>" , "ping vrf IP_ADDRESS".

Test description	Check network connectivity to remote systems for VRF VOIP
How	Issue command "ping vrf VOIP 136.255.240.1 size 1500 donnotfrag count 10"
Expected results	A success rate of 100% should be received RP/0/RSP0/CPU0:ASR#ping vrf VOIP 136.255.240.1 Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 136.255.240.1, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5), round-trip min/avg/max = 16/18/19 ms

4. Teste de compatibilitate SIP

4.1. Pentru testarea compatibilitatii SIP dintre reteaua Vodafone si reteaua Operatorului, se vor face pe fiecare legatura de semnalizare.

Test no.	Voice Call Tests	Expected outcome - SIP & ISUP (SIP-I)
1	Short call setup from User A to User B, User A releases call	Calling party clear after answer SIP – BYE Q.850 – "Normal Call Clearing"
2	Short call setup from User A to User B, User B releases call	Called party clear after answer SIP – BYE Q.850 – "Normal Call Clearing"
3	Short call setup from User B to User A, User A releases call	Called party clear after answer SIP – BYE Q.850 – "Normal Call Clearing"
4	Short call setup from User B to User A, User B releases call	Calling party clear after answer SIP – BYE Q.850 – "Normal Call Clearing"
5	Long call setup from User A to User B, User A releases call (More than 65 sec)	Calling party clear after answer SIP – BYE Q.850 – "Normal Call Clearing"
6	Long call setup from User B to User A, User B releases call (More than 65 sec)	Calling party clear after answer SIP – BYE Q.850 – "Normal Call Clearing"
7	DTMF transfer in-band from User A to User B, in-band	SIP – BYE Q.850 – "Normal Call Clearing"
8	DTMF transfer in-band from User B to User A, in-band	SIP – BYE Q.850 – "Normal Call Clearing"
9	Abandoned Call i.e. caller discards (from A to B)	Calling party clear before answer SIP - 487 Request Terminated

Test no.	Voice Call Tests	Expected outcome - SIP & ISUP (SIP-I)
		Q.850 – "normal call clearing"
10	Abandoned Call i.e. caller discards (from B to A)	Calling party clear before answer SIP - 487 Request Terminated Q.850 – "normal call clearing"
11	Rejected call i.e. callee discards (from A to B)	Called party clear before answer SIP – 486 Busy Here Q.850 – "User Busy"
12	Rejected call i.e. callee discards (from B to A)	Called party clear before answer SIP – 486 Busy Here Q.850 – "User Busy"
13	Called party does not answer (from A to B)	No answer from called party: SIP – 480 Temporarily Unavailable Q.850 – "no answer from the user"
14	Called party does not answer (from B to A)	No answer from called party: SIP – 480 Temporarily Unavailable Q.850 – "no answer from the user"
15	Called party busy (A to B)	Called subscriber busy SIP – 486 Busy Here Q.850 – "User Busy"
16	Called party busy (B to A)	Called subscriber busy SIP – 486 Busy Here Q.850 – "User Busy"
17	Called party not reachable, no IMSI detach (A to B)	No user responding Q.850 – "No user responding"
18	Called party not reachable, no IMSI detach (B to A)	No user responding Q.850 – "No user responding"
19	Called party not reachable (A to B), IMSI detach – mobile to mobile	
20	Called party not reachable (B to A), IMSI detach - mobile to mobile	
21	Unallocated number (A party)	Calling to an unallocated number SIP – 404 Not Found Q.850 - "Unallocated Number"
22	Unallocated number (B party)	Calling to an unallocated number SIP – 404 Not Found Q.850 - "Unallocated Number"
23	Dialled number too short (A party)	Address Incomplete SIP – 404 Not Found Q.850 - "Unallocated Number"
24	Dialled number too short (B party)	Address Incomplete SIP – 404 Not Found Q.850 - "Unallocated Number"
25	Calling Line Identification Restriction (CLIR), (A to B)	Call scenario 6 or 8
26	Calling Line Identification Restriction (CLIR), (B to A)	Call scenario 8

Test no.	Supplementary Services Tests	Additional discription
1	Call Forwarding Unconditional (CFU), (A to B)	Call scenario 6 or 8 with CF unconditional to C=+491779000*
2	Call Forwarding Unconditional (CFU), (B to A)	Call scenario 7 with CF unconditional to C=+491779000*
3	Call Forwarding Unconditional (CFU), multiple CFU, (A to B)	
4	Call Forwarding Unconditional (CFU), multiple CFU, (B to A)	
5	Call Forwarding Unconditional (CFU), multiple CFU, (A to B)	
6	Call Forwarding Unconditional (CFU), multiple CFU, (B to A)	
7	Call Forwarding On No Reply (CFNR), (A to B)	Call scenario 6 or 8 with CFNR to C=+491779000*
8	Call Forwarding On No Reply (CFNR), (B to A)	Call scenario 7 with CFNR to C=+491779000*
9	Call Waiting (CW), (A to B)	Call scenario 6 or 8 called party=busy CW active
10	Call Waiting (CW), (B to A)	Call scenario 7 called party=busy CW active
11	Call Hold (CH) during single call	Call scenario 6 or 8
12	Multiparty (MPTY) call, (A to B)	Call scenario 6 with more than one B party
13	Multiparty (MPTY) call, (B to A)	Call scenario 8 with more than one B party
14	Explicit Call Transfer (ECT), (A to B)	
15	Explicit Call Transfer (ECT), (B to A)	

5. Teste de rutare

5.1. In cadrul testelor de rutare se va urmari implementarea planului de rutare stabilit intre cei doi operatori conform licentei acordate prin LURN. Totodata se va urmari trasmiterea numerotatiei asa cum este specificat in Anexa „Specificatii Tehnice".

6. Teste de taxare

6.1. In vederea testarii acuratetei in taxare, se vor efectua apeluri de test, altele decat cele specificate in testele de validare a compatibilitatii SIP, pentru toate plajele de numerotatie presupuse de serviciile reglementate de prezentul Acord, dupa cum urmeaza: se vor efectua 14 de apeluri de test pe fiecare directie de trafic (in cazul traficului bidirectional 14 apeluri intrare, 14 apeluri iesire), fiecare Parte folosind numere de test ce vor fi comunicate la momentul testarii. Rezultatul acestor teste va fi folosit pentru reconcilierea informatiilor de taxare intre sistemele celor doua Parti.

Test no.	CDR Validation Tests
1	Very short (1 second) call, user A releases the call
2	Very short (1 second) call, user B releases the call
3	3 Call < 1 min.
4	1 min. < 3 Calls < 3 min.

Test no.	CDR Validation Tests
5	10 min. < 3 Calls < 30 min.
6	3 Calls > 30 min.

6.2. Pentru fiecare apel de test se va verifica:

- Respectarea formatelor numerelor partii apelante, respectiv a partii apelate, in conformitatea cu termenii Anexei „Specificatii Tehnice"
- Respectarea datei/orei de initiere a apelului.
- Respectarea duratei apelului, diferenta intre durata inregistrata de Vodafone si cea inregistrata de Operator pentru fiecare apel sa nu depaseasca 2 secunde.

6.3. Pentru toate apelurile efectuate, se va verifica ca discrepanta intre durata totala inregistrata de Vodafone si cea inregistrata de Operator se afla in limitele stabilite de acord, in Anexa „Facturarea si Plata".

6.4. Testele de taxare se considera incheiate cu succes daca sunt indeplinite conditiile mentionate in art. 6.2 si art. 6.3 de mai sus.

OPERATOR	**VODAFONE ROMANIA S.A.**
	Nicolae Panait Manager, Regional Mobile Core Strategy Department
Data:	Data: