

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_6P_01		
<b>Objective:</b>	Check a 6N can COUNT the cells allocated in the schedule to a given neighbor, according to draft-ietf-6tisch-6top-protocol-05.		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	IEEE802.15.4e, draft-ietf-6tisch-6top-protocol-05		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DG sends EB periodically, every 10 sec [2].</li> <li>• All EB packets are sent on a single frequency.</li> <li>• Power on DR.</li> <li>• Wait until the 6N join the DR</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	<ul style="list-style-type: none"> <li>• The 6N1 sends a 6P ADD request to the DR for 1 slot.</li> <li>• The candidate list is {4,5}.</li> </ul>
	1	Stimulus	The 6N1 sends a 6P COUNT request to the DR.
	2	Check	The PS captures the sequence of request and response
	3	Check	Check the packet header captured by the sniffer has the same format defined in the draft-ietf-6tisch-6top-protocol-05 for both the request and the response
	4	Check	<ul style="list-style-type: none"> <li>• Check that the returned code for the operation is SUCCESS.</li> <li>• The counter value received is 2.</li> </ul>

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_6P_02		
<b>Objective:</b>	Check a 6N can obtain the LIST of cells in the schedule, according to draft-ietf-6tisch-6top-protocol-05.		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	IEEE802.15.4e, draft-ietf-6tisch-6top-protocol-05.		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DG sends EB periodically, every 10 sec [2].</li> <li>• All EB packets are sent on a single frequency.</li> <li>• Power on DR.</li> <li>• Wait until the 6N join the DR.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The 6N1 sends a 6P ADD request to the DR for 2 slots. The candidate list is {4,5}.
	1	Stimulus	The 6N1 sends a 6P LIST request to the DR.
	2	Check	The PS captures the sequence of request and response
	3	Check	Check the packet header captured by the sniffer has the same format defined in the draft-ietf-6tisch-6top-protocol-05 for both the request and the response
	4	Check	<ul style="list-style-type: none"> <li>• Check that the code field in the response is EOL.</li> <li>• Check the cell list is {4,5}</li> </ul>

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_6P_03		
<b>Objective:</b>	Check a 6N can CLEAR the schedule of a node, according to draft-ietf-6tisch-6top-protocol-05.		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	IEEE802.15.4e, draft-ietf-6tisch-6top-protocol-05		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DG sends EB periodically, every 10 sec [2].</li> <li>• All EB packets are sent on a single frequency.</li> <li>• Power on DR.</li> <li>• Wait until the 6N join the DR.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	<ul style="list-style-type: none"> <li>• The 6N1 sends a 6P ADD request to the DR for 2 slots.</li> <li>• The candidate list is {4,5}.</li> </ul>
	1	Stimulus	The 6N1 sends a 6P COUNT request to the DR.
	2	Check	<ul style="list-style-type: none"> <li>• Check that the returned code for the operation is SUCCESS.</li> <li>• The counter value received is 2.</li> </ul>
	3	Stimulus	The 6N1 sends a 6P CLEAR request to the DR.
	4	Check	The PS captures the sequence of request and response.
	5	Check	Check the packet header captured by the sniffer has the same format defined in the draft-ietf-6tisch-6top-protocol-05 for both the request and the response
	6	Check	Check that the returned code for the operation is SUCCESS.
	7	Stimulus	The 6N1 sends a 6P COUNT request to the DR.
	8	Check	<ul style="list-style-type: none"> <li>• Check that the returned code for the operation is SUCCESS.</li> <li>• The counter value received is 0.</li> </ul>

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_6P_04		
<b>Objective:</b>	Check that concurrent transaction cannot request for the same cells in the schedule according to draft-ietf-6tisch-6top-protocol-05		
<b>Configuration:</b>	star		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	IEEE802.15.4e, draft-ietf-6tisch-6top-protocol-05		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DG sends EB periodically, every 10 sec [2].</li> <li>• All EB packets are sent on a single frequency.</li> <li>• Power on DR.</li> <li>• Wait until all 6N join the DR</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	<ul style="list-style-type: none"> <li>• The 6N1 sends a 6P ADD request to the DR for 2 slots.</li> <li>• The candidate list is {4,5}.</li> </ul>
	1	Stimulus	<ul style="list-style-type: none"> <li>• The 6N2 sends a 6P ADD request to the DR for 2 slots.</li> <li>• The candidate list is {4,5}.</li> </ul>
	2	Check	Check that the returned code for the operation is BUSY.

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_6P_05		
<b>Objective:</b>	Check the timeout after a 6P request, is implemented according to draft-ietf-6tisch-6top-protocol-05.		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	IEEE802.15.4e, draft-ietf-6tisch-6top-protocol-05		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DG sends EB periodically, every 10 sec [2].</li> <li>• All EB packets are sent on a single frequency.</li> <li>• Power on DR.</li> <li>• Wait until the 6N joins the DR</li> <li>• Disable the 6P response</li> <li>• Timeout is set to 1 second by the SF</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	<ul style="list-style-type: none"> <li>• The 6N1 sends a 6P ADD request to the DR for 2 slots.</li> <li>• The candidate list is {4,5}.</li> </ul>
	1	Stimulus	Enable the 6P response at the DR
	2	Stimulus	<ul style="list-style-type: none"> <li>• The 6N1 sends a 6P ADD request to the DR for 2 slots.</li> <li>• The candidate list is {4,5}.</li> </ul>
	3	Check	Check that the returned code for the operation is BUSY.
	4	Stimulus	The 6N1 waits for the timeout to elapse.
	5	Stimulus	<ul style="list-style-type: none"> <li>• The 6N1 sends a 6P ADD request to the DR for 2 slots.</li> <li>• The candidate list is {4,5}.</li> </ul>
	6	Check	Check that the returned code for the operation is SUCCESS.

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_FORMAT_01		
<b>Objective:</b>	Check the format of the IEEE802.15.4e EB packet is correct.		
<b>Configuration:</b>	Single hop (1DR, and a GD/sniffer) 6N is not needed for this test		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	IEEE802.15.4e, draft-ietf-6tisch-minimal-11		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DG sends EB periodically, every 10 sec [2].</li> <li>• All EB packets are sent on a single frequency.</li> <li>• Power on DR.</li> <li>• Turn on the sniffer at SYN F.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The DG sends an EB
	1	Check	The PS capture the EB
	2	Check	Check the packet header captured by the sniffer has the same format defined in the IEEE802.15.4e standard.
	3	Check	Check the sync IE captured by the sniffer has the same format defined in draft-ietf-6tisch-minimal-11
	4	Check	Check the timeslot Template IE captured by the sniffer has the same format defined in draft-ietf-6tisch-minimal-11
	5	Check	Check the Channel Hopping IE captured by the sniffer has the same format defined in draft-ietf-6tisch-minimal-11
	6	Check	Check the frame & link IE captured by the sniffer has the same format defined in draft-ietf-6tisch-minimal-11

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_FORMAT_02		
<b>Objective:</b>	Check the timing template of TSCH time slot defined in draft-ietf-6tisch-minimal-11 is correctly implemented		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	draft-ietf-6tisch-minimal-11		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• DR sends only one EB for allowing synchronization of 6N</li> <li>• If DR is able to ping 6N (thus, they exchange Echo Request and Echo Reply), it means they are using the same timing template.</li> <li>• Power on 6N and DR</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The DR sends an Echo Request DATA message.
	1	Check	The 6N sends an Echo Reply ACK message.
	2	Check	The DR correctly receives the Echo Reply message.

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_FORMAT_03		
<b>Objective:</b>	Check the channel hopping on frequency is correctly implemented (i.e., the 6N sends DATA packets on different channels in consecutive slotframes)		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	draft-ietf-6tisch-minimal-11		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• Number of available frequencies is set to 16</li> <li>• Only one slot (corresponding to slotOffset 0) is scheduled for sending and receiving DATA packets.</li> <li>• Per each slotframe, the sniffer is listening on a different frequency, calculated according to the channel sequence defined in draft-ietf-6tisch-minimal-11.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The 6N sends a data packet through slot 0
	1	Check	The PS captures the packet as expected
	2		<ul style="list-style-type: none"> <li>• Change the channel the PS is listening on, according the channel hopping sequence in draft-ietf-6tisch-minimal-11.</li> <li>• Wait until the next slotframe, when the channel hopping will happen.</li> </ul>
	3	Check	Check the PS capture the DATA packet on the channel when the hopping happened.
	4	Check	Repeat step 3 and step 4, for all the other 14 frequencies.

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_FORMAT_04		
<b>Objective:</b>	Check the retransmissions time is 3 as defined in draft-ietf-6tisch-minimal-11		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	draft-ietf-6tisch-minimal-11		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• DR sends EB periodically, every 10 sec as per [2].</li> <li>• 6N is synchronized to DG (according to TD_6TiSCH_SYN_01).</li> <li>• The DR is configured to not send ACK back to 6N after receiving packets from 6N.</li> <li>• All frames are sent on a single frequency.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The 6N sends a KA packet to the DR
	1	Check	The PS captures the KA packet
	2	Check	No ACK packet is captured by the PS
	3	Check	3 more KA packets are captured by the PS and all of them without ACK response

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_FORMAT_05		
<b>Objective:</b>	Check the minimal schedule (with slotframe size equal to 11 slots, and 1 single scheduled cell) is correctly implemented according to draft-ietf-6tisch-minimal-11		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	draft-ietf-6tisch-minimal-11		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• DR sends EB periodically, every 10 sec as per [2].</li> <li>• 6N is synchronized to DG (according to TD_6TiSCH_SYN_01).</li> <li>• Power on DR and 6N.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The DR send an EB
	1	Check	The 6N after getting synchronized, sends an EB.
	2	Check	Check the minimal schedule is well implemented, by checking the value of the IEs in the EB sent by 6N

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_FORMAT_06		
<b>Objective:</b>	Check a 6N sets its slotframe length correctly when joining the network (according to information in EB packet and linkIE)		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	draft-ietf-6tisch-minimal-11		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• Set slotframe size of DR equal to 11</li> <li>• Power on 6N and DR</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The DR sends an EB.
	1	Check	The 6N get synchronized, and sends an EB.
	2	Check	The slotframe size in the EB sent by the 6N and captured by the PS has the same value of the slotframe size of the EB sent by the DR.
	3		Set slotframe size of DR equal to 7
	4	Check	The DR sends a new EB announcing the new slotframe size (equal to 7)
	5	Check	Wait till 6N get synchronized again with DR, and check the EB sent by 6N is announcing slotframe size equal to 7.

Interoperability Test Description			
<b>Identifier:</b>	TD_6TiSCH_SEC_01		
<b>Objective:</b>	Check the 6N is correctly authenticated with K1, when it synchronizes to DR with EB		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	draft-ietf-6tisch-minimal-15		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DR sends EBs periodically, with a fast rate (equal to 10 sec, according to [2]), so that the 6N does not need to send KAs for keeping synchronization.</li> <li>• The 6N needs to listen to one EB only.</li> <li>• All frames are sent on a single frequency.</li> <li>• The SEC option is enabled on DR and 6N</li> <li>• The key K1 is set according to draft-ietf-6tisch-minimal-15[2]</li> <li>• Power on 6N and DR.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The DR sends EB
	1	Check	The 6N receives the EB and get synchronized.
	2	Check	The 6N sends EB.
	3	Check	The DR receives the EB from 6N

Interoperability Test Description			
<b>Identifier:</b>	TD_6TISCH_SEC_02		
<b>Objective:</b>	Check the data packet sent by 6N is correctly encrypted with K2.		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	draft-ietf-6tisch-minimal-15		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• All frames are sent on a single frequency.</li> <li>• The SEC option is enabled on DR and 6N.</li> <li>• The key K1 and the key K2 are set according to draft-ietf-6tisch-minimal-15[2] and Section 7 of the TD.</li> <li>• Power on 6N and DR.</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	DR sends a ping DATA packet to 6N
	1	Check	6N sends an Echo Reply message to DR
	2	Check	Check the DATA is correctly encrypted/decrypted with K2

Interoperability Test Description			
<b>Identifier:</b>	TD_6TISCH_SYN_01		
<b>Objective:</b>	Check that a 6N can synchronize to the EB sent by the DR and parse all the IEs with their default values.		
<b>Configuration:</b>	single-hop		
<b>Technologies:</b>			
<b>Level:</b>			
<b>References:</b>	IEEE802.15.4e		
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• The DR sends EBs periodically, with a fast rate (equal to 10 sec, according to [2]), so that the 6N does not need to send KAs for keeping synchronization</li> <li>• The 6N needs to listen to one EB only</li> <li>• All EBs are sent on a single frequency.</li> <li>• Power on 6N and DR</li> </ul>		
<b>Test Sequence:</b>	Step	Type	Description
	0	Stimulus	The DR sends EB periodically
	1	Check	The 6N receives one EB and get synchronized
	2	Check	The DR receives an EB sent by 6N