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Supporting the Exercise command for PSC linear protection protocol
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Abstract

This draft indicates how IETF [RFC6378](#) could be modified to address the Exercise function.

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EXER command in PSC

September 2013

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[1.](#) Introduction

Exercise is a command to test if the PSC communication is operating correctly. More specifically, the Exercise is to test and validate the linear protection mechanism and PSC protocol including the aliveness of the Local Request logic, the PSC state machine and the PSC message generation and reception, and the integrity of the protection path, without triggering the actual traffic switching. It is used while the working path is either carrying the traffic or not. It is lower priority than any "real" switch request. It is only valid in bidirectional switching, since this is the only place where one can get a meaningful test by looking for a response.

This command is documented in R84 of [\[RFC5654\]](#) and it has been identified as a requirement in the ITU's liaison statement "Liaison Statement: Recommendation ITU-T G.8131/Y.1382 revision - Linear protection switching for MPLS-TP networks " [\[LIAISON1205\]](#) and "Recommendation ITU-T G.8131 revision - Linear protection switching for MPLS-TP networks [\[LIAISON1234\]](#)". This draft is created as an

attempt to align PSC behaviour and functionalities to meet IETF and ITU-T MPLS Transport Profile requirements.

2. Updates to the PSC RFC

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This section describes the changes required to cover the exercise functionality to the PSC protocol defined in [[RFC6378](#)]

2.1. Updates to [Section 2.1](#). Acronyms

The following text should be added in [Section 2.1 in \[RFC6378\]](#):

EXER Exercise
RR Reverse Request

2.2. Updates to [Section 3.1](#). Local Request Logic

EXER should be included as an operator command.

The following text should be added:

- o Exercise (EXER) - Exercise is a command to test if the PSC communication is operating correctly. It is lower priority than any "real" switch request. It is only valid in bidirectional switching, since this is the only place where one can get a meaningful test by looking for a response.

2.3. Update to [Section 3.2](#). Remote Requests

The following text should be added:

- o Remote EXER - indicates that the remote end point is operating under an operator command to validate the protection mechanism and PSC protocol including the aliveness of the Local Request logic, the PSC state machine and the PSC message generation and reception, and the integrity of the protection path, without triggering the actual traffic switching. The valid response to EXER message will be an RR with the corresponding FPath and Path numbers. The near end will signal a Reverse Request (RR) only in response to an EXER command from the far end.

When Exercise commands are input at both ends, an EXER, instead of RR, is transmitted from both ends.

[2.4.](#) Updates to [Section 3.6.](#) PSC Control States

The following text should be added:

- o Exercise state - The operator has issued the Exercise command to test and validate the protection mechanism and PSC protocol including the integrity of the protection path, without triggering the actual traffic switching.

[2.5.](#) Updates to [Section 4.2.2.](#) PSC Request Field

The following PSC Requests should be added to PSC Request field:

(3) Exercise - indicates that the transmitting end point is exercising the protection channel and mechanism. FPath and Path are set to the same value of the NR, RR or DNR request that EXER replaces.

(2) Reverse Request - indicates that the transmitting end point is responding to an EXER command from the far end. FPath and Path are set to the same value of the NR, RR or DNR request that EXER replaces.

[2.6.](#) Updates to [Section 4.3.2.](#) Priority of Inputs

The priority of the Exercise should be inserted between the priorities of WTR Expires and No Request.

[2.7.](#) Updates to [Section 4.3.3.](#) Operation of PSC States

[2.7.1.](#) Updates to [Section 4.3.3.1.](#) Normal State

Add the following text for [Section 4.3.3.1.](#) Normal State:

- o A local Exercise input SHALL cause the LER to go into local Exercise state and begin transmission of an EXER(0,0) message.
- o A remote EXER message SHALL cause the LER to go into remote

Exercise state, and transmit an RR(0,0)message.

2.7.2. Updates to [Section 4.3.3.6](#). Do-not-Revert State

Add the following text for [Section 4.3.3.6](#). Do-not-Revert State:

- o A local Exercise input SHALL cause the LER to go into local Exercise state and begin transmission of an EXER(0,1) message.
- o A remote EXER message SHALL cause the LER to go into remote Exercise state, and transmit an RR(0,1)message.

2.7.3. New subsection for Exercise State

Add a new sub-section, [Section 4.3.3.7](#). Exercise State, with the following text:

In the Exercise state, the user data traffic SHALL remain on the same path as the previous state, such as Normal state or Do-Not-Revert

state. The local end SHALL signal a RR message in response to a remote EXER message. When both ends are in local Exercise state, only the EXER messages are exchanged.

When in Exercise state, the following describe the reaction to local input:

- o A local Clear SHALL be ignored if in remote Exercise state. If in local Exercise state, then this input SHALL cause the LER to go into Normal state and being transmitting NR(0,0) when the LER is configured for revertive mode. For non-revertive mode, the LER goes into DNR state and begin transmitting DNR(0,1).
- o A local Lockout of protection input SHALL cause the LER to go into local Unavailable state and begin transmission of an LO(0,0) message.
- o A local Forced Switch input SHALL cause the LER to go into local Protecting administrative state and begin transmission of an FS(1,1) message.
- o A local Signal Fail indication on the protection path SHALL cause

the LER to go into local Unavailable state and begin transmission of an SF(0,0) message.

- o A local Signal Fail indication on the working path SHALL cause the LER to go into local Protecting failure state and begin transmission of an SF(1,1) message.
- o A local Manual Switch input SHALL cause the LER to go into local Protecting administrative state and begin transmission of an MS(1,1) message.
- o A local EXER input can be applied when the local end is in remote EXER state. This SHALL cause the LER to remain in the EXER state, but begin transmission of an EXER message instead of RR message.
- o All other local inputs SHALL be ignored.

When in Exercise state, the following describe the reaction to remote messages:

- o A remote Lockout of protection message SHALL cause the LER to go into remote Unavailable state and begin transmission of an NR(0,0) message.

- o A remote Forced Switch message SHALL cause the LER to go into remote Protecting administrative state and begin transmission of an NR(0,1) message.
- o A remote Signal Fail message for the protection path SHALL cause the LER to go into remote Unavailable state and begin transmission of an NR(0,0) message.
- o A remote Signal Fail message for the working path SHALL cause the LER to go into remote Protecting failure state and begin transmission of an NR(0,1) message.
- o A remote Manual Switch message SHALL cause the LER to go into remote Protecting administrative state and begin transmission of an NR(0,1) message.

- o A remote DNR(0,1) message received in remote Exercise state SHALL cause the LER to go into DNR state and begin transmitting DNR(0,1). A remote DNR(0,1) message in local Exercise state is ignored.
- o A remote NR(0,0) message received in remote Exercise state SHALL cause the LER to go into Normal state and begin transmitting NR(0,0). A remote NR message in local Exercise state is ignored.
- o All other local inputs SHALL be ignored.

2.8. Updates to [Appendix A](#). PSC State Machine Tables

Add the following extended states:

E::L = Exercise due to local EXER command
 E::R = Exercise due to remote EXER message

Add the following messages:

State REQ(FP, P)

 E::L EXER(0,0) for revertive, or EXER(0,1) for non-revertive
 E::R RR(0,0) for revertive, or RR(0,1) for non-revertive

Add the following line to the local inputs describing the table description rows:

EXER Exercise

Add the following line to the remote inputs describing the table description rows:

EXER remote Exercise
 RR Reverse Request

Modify the state machine as follows (only relevant cells are shown):

Part 1: Local input state machine

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

	OC	LO	SF-P	FS	SF-W	SFc	MS	WTRE xp	EX ER
N									E: :L
UA:LO :L									i
UA:P: L									i
UA:LO :R									i
UA:P: R									i
PF:W: L									i
PF:W: R									i
PA:F: L									i
PA:M: L									i
PA:F: R									i
PA:M: R									i
WTR									i
DNR									E: :L

E::L	[20	UA:LO	UA:P	PA:F	PF:W	i	PA:M	i	i
]	:L	:L	:L	:L		:L		
E::R	i	UA:LO	UA:P	PA:F	PF:W	i	PA:M	i	E:
		:L	:L	:L	:L		:L		:L

Part 2: Remote messages state machine

	LO	SF-P	FS	SF-W	MS	WTR	DN R	N R	EX ER	R R
N									E: :R	i
UA:LO :L									i	i
UA:P: L									i	i
UA:LO :R									i	i
UA:P: R									i	i
PF:W: L									i	i
PF:W: R									i	i
PA:F: L									i	i
PA:M: L									i	i
PA:F: R									i	i
PA:M: R									i	i

WTR										i	i
DNR										E:	i
										:R	
E::L	UA:LO	UA:P	PA:F	PF:W	PA:M	i	i	i	i	i	i
	:R	:R	:R	:R	:R						
E::R	UA:LO	UA:P	PA:F	PF:W	PA:M	i	DN	N	i	i	
	:R	:R	:R	:R	:R		R				

[20] Transition to N for revertive mode, transition to DNR for non-revertive mode

2.9. Updates to [Appendix B](#). Exercising the Protection Domain

Remove [Appendix B](#).

3. IANA Considerations

This document makes no request of IANA.

Note to RFC Editor: this section may be removed on publication as an RFC.

4. Security Considerations

No specific security issue is raised in addition to those ones already documented in [[RFC6378](#)]

5. Acknowledgements

6. References

6.1. Normative References

- [RFC5654] Niven-Jenkins, B., Brungard, D., Betts, M., Sprecher, N., and S. Ueno, "Requirements of an MPLS Transport Profile", [RFC 5654](#), September 2009.
- [RFC6378] Weingarten, Y., Bryant, S., Osborne, E., Sprecher, N., and A. Fulignoli, "MPLS Transport Profile (MPLS-TP) Linear Protection", [RFC 6378](#), October 2011.

6.2. Informative References

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[LIAISON1205]

ITU-T SG15, ., "Liaison Statement: Recommendation ITU-T G.8131/Y.1382 revision - Linear protection switching for MPLS-TP networks ", <https://datatracker.ietf.org/liaison/1205/> , October 2012.

[LIAISON1234]

ITU-T SG15, ., "Liaison Statement: Recommendation ITU-T G.8131 revision - Linear protection switching for MPLS-TP networks ", <https://datatracker.ietf.org/liaison/1234/> , February 2013.

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