

MPLS Working Group
Internet-Draft
Intended status: Standards Track
Expires: March 14, 2014

T. Cheung
ETRI
A. D'Alessandro
Telecom Italia
H. van Helvoort
Huawei Technologies
September 10, 2013

**PSC protocol updates for non-revertive operation
draft-cdh-mpls-tp-psc-non-revertive-01.txt**

Abstract

This document optionally updates [[RFC6378](#)], "MPLS Transport Profile (MPLS-TP) Linear Protection", to change non-revertive operation to be aligned with the behavior defined in [[RFC4427](#)] and in an effort to satisfy the ITU-T's protection switching requirements. An operator command, Manual Switch to Working (MS-W) is also included to revert traffic to the working path in non-revertive operation.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on March 14, 2014.

Copyright Notice

Copyright (c) 2013 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect

to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1.	Introduction	2
1.1.	Motivation for adding MS-W	3
1.2.	Behavior of MS-P and MS-W	3
1.3.	Equal priority resolution	3
2.	Conventions Used in This Document	4
3.	Acronyms	4
4.	Updates to the PSC RFC	4
4.1.	Updates to Section 2.1 . Acronyms	4
4.2.	Updates to Section 3.1 . Local Request Logic	5
4.3.	Updates to Section 3.2 . Remote Requests	6
4.4.	Updates to Section 3.6 . PSC Control States	6
4.5.	Updates to Section 4.2.2 . PSC Request Field	7
4.6.	Updates to Section 4.3.2 . Priority of Inputs	7
4.7.	Updates to Section 4.3.3.1 . Normal State	9
4.8.	Updates to Section 4.3.3.2 . Unavailable State	11
4.9.	Updates to Section 4.3.3.3 . Protecting Administrative State	12
4.10.	Updates to Section 4.3.3.4 . Protecting Failure State	15
4.11.	Updates to Section 4.3.3.5 . Wait-to-Restore State	16
4.12.	Updates to Section 4.3.3.6 . Do-not-Revert State	17
4.13.	Updates to Appendix A . PSC State Machine Tables	19
5.	Security considerations	22
6.	IANA considerations	22
7.	Acknowledgements	22
8.	Normative References	22
	Authors' Addresses	22

[1.](#) Introduction

Non-revertive mode of protection switching is defined in [[RFC4427](#)]. In this mode, the traffic does not return to the working path when switch-over requests are terminated.

However, PSC protocol defined in [[RFC6378](#)] supports this operation only when recovering from a defect condition, but does not operate as non-revertive when an operator's switch-over command such as Forced Switch or Manual Switch is cleared. To be aligned with legacy transport network behavior and [[RFC4427](#)], a node should go into the Do-not-Revert (DNR) state not only when a failure condition on a working path is cleared but also when an operator command requesting switch-over is cleared.

Changing the non-revertive operation introduces necessity of a new operator command to revert traffic to the working path when in DNR state. Moreover, according to [Section 4.3.3.6](#) (Do-not-Revert State) in [\[RFC6378\]](#), "to revert back to Normal state, the administrator SHALL issue a Lockout of protection command followed by a Clear command." This requirement introduces the potential risk of an unprotected situation while the Lockout of protection is in effect. Manual Switch-over for recovery LSP/span command, defined in [\[RFC4427\]](#) and also defined in [\[RFC5654\]](#), Requirement 83, as one of the mandatory external commands, should be used for this purpose, but is not included in [\[RFC6378\]](#).

This document optionally updates [\[RFC6378\]](#) to change non-revertive operation to be aligned with the behavior defined in [\[RFC4427\]](#) and to meet the ITU-T's protection switching requirements, and add a new operator command, Manual Switch to Working (MS-W) to avoid the potential problem with the Lockout of protection command when the DNR should be cleared. For the sake of clarity, Manual Switch (MS) defined in [\[RFC6378\]](#) is renamed Manual Switch to Protection (MS-P).

[1.1.](#) Motivation for adding MS-W

Most of the operational interventions on working paths are executed after operating a "Manual switch-over for normal traffic" switch command that switches the normal traffic from the working path to the protection path. This command will keep the traffic on the protection path unless a "Manual switch-over for recovery LSP/span" command is issued that switches the normal traffic back to the working path. Using Lockout of protection command as currently suggested in [\[RFC6378\]](#) may cause, in some circumstances, traffic loss.

[1.2.](#) Behavior of MS-P and MS-W

The MS-P and MS-W commands SHALL have the same priority. If one of these commands is already issued, and the other command is issued afterwards, it SHALL be ignored. If two LERs are requesting opposite operations simultaneously, i.e. one LER is sending MS-P while the other LER is sending MS-W, the MS-W SHALL be considered to have a higher priority than MS-P, and MS-P SHALL be ignored.

This behavior is described in [Section 4.2](#) that proposes updates to [Section 3.1](#) "Local Request Logic" of [\[RFC6378\]](#).

[1.3.](#) Equal priority resolution

[\[RFC6378\]](#) defines only one rule for equal priority condition in [Section 4.3.2](#) as "The remote message from the far-end LER is assigned

a priority just below the similar local input." In order to support the manual switch behavior described in [Section 1.2](#), additional rules for equal priority resolution are required, and are described in [Section 4.6](#) that proposes updates to [Section 4.3.2](#). "Priority of Inputs" of [[RFC6378](#)].

[2.](#) Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

[3.](#) Acronyms

This draft uses the following acronyms:

MPLS-TP	Transport Profile for MPLS
MS	Manual Switch
MS-P	Manual Switch to Protection
MS-W	Manual Switch to Working
PSC	Protection State Coordination Protocol

[4.](#) Updates to the PSC RFC

This section describes the changes required to change non-revertive operation and add "Manual Switch to Working" operator command in the PSC protocol defined in [[RFC6378](#)].

The term "Manual Switch" and its acronym "MS" used in [[RFC6378](#)] are replaced respectively by "Manual Switch to Protection" and "MS-P" by this document to avoid confusion with "Manual Switch to Working" and its acronym "MS-W".

Also, the term "Protecting administrative state" used in [[RFC6378](#)] is replaced by "Switching administrative state" by this document to include the case where traffic is switched back to the working path by administrative Manual Switch to Working command.

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

Replace the following bullet item:

MS Manual Switch

With:

MS-P Manual Switch to Protection

MS-W Manual Switch to Working

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

Replace the following text in the bullet item for operator command:

The commands Forced Switch, Manual Switch, Clear, Lockout of protection (defined in [[RFC4427](#)] as Forced switch-over, Manual switch-over, Clear, and Lockout of recovery LSP/span, respectively) MUST be supported.

With:

The commands Forced Switch, Manual Switch to Protection, Manual Switch to Working, Clear, Lockout of protection (defined in [[RFC4427](#)] as Forced switch-over for normal traffic, Manual switch-over for normal traffic, Manual switch-over for recovery LSP/span, Clear and Lockout of recovery LSP/span, respectively) MUST be supported.

Replace the following bullet item in the local request list:

- o Manual Switch (MS) - if the operator requested that traffic be switched from the working path to the protection path. This is only relevant if there is no currently active fault condition or operator command.

With:

- o Manual Switch to Protection (MS-P) - if the operator requested that traffic be switched from the working path to the protection path. This is only relevant if there is no currently active fault condition or operator command.
- o Manual Switch to Working (MS-W) - if the operator requested that traffic be switched from the protection path to the working path. This is only relevant if there is no currently active fault condition or operator command.

Add the following text above the last paragraph:

The MS-P and MS-W commands SHALL have the same priority. If one of these commands is already issued, and the other command is issued afterwards, it SHALL be ignored. If two LERs are requesting opposite operations simultaneously, i.e. one LER is sending MS-P while the other LER is sending MS-W, the MS-W SHALL

be considered to have a higher priority than MS-P, and MS-P SHALL be ignored.

4.3. Updates to [Section 3.2](#). Remote Requests

Replace the following bullet item in the remote request list:

- o Remote MS - indicates that the remote end point is operating under an operator command to switch the traffic from the working path to the protection path.

With:

- o Remote MS-P - indicates that the remote end point is operating under an operator command to switch the traffic from the working path to the protection path.
- o Remote MS-W - indicates that the remote end point is operating under an operator command to switch the traffic from the protection path to the working path.

Replace the following bullet item:

- o Remote DNR - indicates that the remote end point has determined that the failure condition has recovered and will continue transporting traffic on the protection path due to operator configuration that prevents automatic reversion to the Normal state.

With:

- o Remote DNR - indicates that the remote end point has determined that the switch-over condition by administrative commands has ceased or that the failure condition has recovered and will continue transporting traffic on the protection path due to operator configuration that prevents automatic reversion to the Normal state.

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

Replace the following bullet item in the protection domain states list:

- o Protecting administrative state - The operator has issued a command switching the user traffic to the protection path.

With:

- o Switching administrative state - The operator has issued a command switching the user traffic either from the working path to the protection path or from the protection path to the working path.

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

Replace the following bullet item in the request list:

- o (5) Manual Switch - indicates that the transmitting end point has switched traffic to the protection path as a result of an administrative Manual Switch command. The FPath field SHALL indicate that the working path is being blocked (i.e., FPath set to 1), and the Path field SHALL indicate that user data traffic is being transported on the protection path (i.e., Path set to 1).

With:

- o (5) Manual Switch - indicates that the transmitting end point has switched traffic to the protection path as a result of an administrative Manual Switch to Protection (MS-P) command or to the working path as a result of an administrative Manual Switch to Working (MS-W) command. Two commands, MS-P and MS-W are represented by the same Request Field value, but differentiated by the FPath value. When traffic is switched to the protection path, the FPath field SHALL indicate that the working path is being blocked (i.e., FPath set to 1), and the Path field SHALL indicate that user data traffic is being transported on the protection path (i.e., Path set to 1). When traffic is switched to the working path, the FPath field SHALL indicate that the protection path is being blocked (i.e., FPath set to 0), and the Path field SHALL indicate that user data traffic is being transported on the working path (i.e., Path set to 0).

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

Replace the following number item:

8. Manual Switch (operator command)

With:

8. Manual Switch to Protection/Working (operator command)

Replace the following two paragraphs:

As was noted above, the Local Request logic SHALL always select the local input indicator with the highest priority as the current local request, i.e., only the highest priority local input will be

used to affect the control logic. All local inputs with lower priority than this current local request will be ignored.

The remote message from the far-end LER is assigned a priority just below the similar local input. For example, a remote Forced Switch would have a priority just below a local Forced Switch but above a local Signal Fail on protection input. As mentioned in [Section 3.6.1](#), the state transition is determined by the higher priority input between the highest priority local input and the remote message. This also determines the classification of the state as local or remote. The following subsections detail the transition based on the current state and the higher priority of these two inputs.

With:

As was noted above, the Local Request logic SHALL always select the local input indicator with the highest priority as the current local request, i.e., only the highest priority local input will be used to affect the control logic. All local inputs with lower priority than this current local request will be ignored. For local inputs with same priority, first-come, first-served rule is applied. For example, once MS-P (or MS-W) local input is determined as the highest priority local input, then subsequent MS-W (or MS-P) local input will be ignored and automatically canceled.

The remote message from the far-end LER is assigned a priority just below the same local input. For example, a remote Forced Switch would have a priority just below a local Forced Switch but above a local Signal Fail on protection input.

However, if the LER is in a remote state due to a remote message, a subsequent local input having the same priority but requesting different action to the control logic, will be considered as having lower priority than the remote message, and will be ignored. For example, if the LER is in remote Switching administrative status due to a remote MS-P, then subsequent local MS-W will be ignored and automatically canceled.

It should be noted that there is a reverse case where one LER receives a local command and the other LER receives, simultaneously, a command with the same priority but requesting different action. In this case, each of the two LERs receives a subsequent remote message having the same priority but requesting different action, while the LER is in a local state due to the local input. In this case, a priority must be set for the commands with the same priority regardless of its origin (local

input or remote message). For example, one LER receives MS-P as a local input and the other LER receives MS-W as a local input, simultaneously. In this case, MS-W SHALL be considered as having higher priority than MS-P at both LERs.

In order to resolve the equal priority conditions described above, following rules are defined:

- * If two local inputs having same priority but requesting different action come to the Local Request logic, then the input coming first SHALL be considered to have a higher priority than the other coming later (first-come, first-served).
- * If the LER receives both a local input and a remote message with the same priority and requesting the same action, i.e., the same PSC Request Field and the same FPath value, then the local input SHALL be considered to have a higher priority than the remote message.
- * If the LER receives both a local input and a remote message with the same priority but requesting different actions, i.e., the same PSC Request Field but different FPath value, then the first-come, first-served rule SHALL be applied. If the remote message comes first, then the state SHALL be a remote state and subsequent local input is ignored. However, if the local input comes first, the first-come, first-served rule cannot be applied and must be viewed as simultaneous condition. This is because the subsequent remote message will not be an acknowledge of the local input by the far-end node. In this case, the priority SHALL be determined by rules for each simultaneous conditions.
- * If the LER receives both MS-P and MS-W commands either as local input or remote message and the LER is in a local Switching administrative state, then the MS-W command SHALL be considered to have a higher priority than the MS-P command.

As mentioned in [Section 3.6.1](#), the state transition is determined by the higher priority input between the highest priority local input and the remote message. This also determines the classification of the state as local or remote. The following subsections detail the transition based on the current state and the higher priority of these two inputs.

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

Replace the following bullet item in the reaction to local input list:

- 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.

With:

- o A local Forced Switch input SHALL cause the LER to go into local Switching administrative state and begin transmission of an FS(1,1) message.

Replace the following bullet item in the reaction to local input list:

- 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.

With:

- o A local Manual Switch Protection input SHALL cause the LER to go into local Switching administrative state and begin transmission of an MS(1,1) message.
- o A local Manual Switch Working input SHALL cause the LER to go into local Switching administrative state and begin transmission of an MS(0,0) message.

Replace the following bullet item in the reaction to remote message list:

- o A remote Forced Switch message SHALL cause the LER to go into remote Protecting administrative state and begin transmitting an NR(0,1) message.

With:

- o A remote Forced Switch message SHALL cause the LER to go into remote Switching administrative state and begin transmitting an NR(0,1) message.

Replace the following bullet item in the reaction to remote message list:

- o A remote Manual Switch message SHALL cause the LER to go into remote Protecting administrative state, and transmit an NR(0,1) message.

With:

- o A remote Manual Switch to Protection message SHALL cause the LER to go into remote Switching administrative state, and transmit an NR(0,1) message.
- o A remote Manual Switch to Working message SHALL cause the LER to go into remote Switching administrative state, while continuing to transmit the NR(0,0) message.

4.8. Updates to [Section 4.3.3.2](#). Unavailable State

Replace the following bullet item in the reaction to local input list:

- o A local Forced Switch SHALL be ignored by the PSC Control logic when in Unavailable state as a result of a (local or remote) Lockout of protection. If in Unavailable state due to an SF on protection, then the FS SHALL cause the LER to go into local Protecting administrative state and begin transmitting an FS(1,1) message. It should be noted that due to the unavailability of the protection path (i.e., due to the SF condition) that this FS may not be received by the far-end until the SF condition is cleared.

With:

- o A local Forced Switch SHALL be ignored by the PSC Control logic when in Unavailable state as a result of a (local or remote) Lockout of protection. If in Unavailable state due to an SF on protection, then the FS SHALL cause the LER to go into local Switching administrative state and begin transmitting an FS(1,1) message. It should be noted that due to the unavailability of the protection path (i.e., due to the SF condition) that this FS may not be received by the far-end until the SF condition is cleared.

Replace the following bullet item in the reaction to remote message list:

- o A remote Forced Switch message SHALL be ignored by the PSC Control logic when in Unavailable state as a result of a (local or remote) Lockout of protection. If in Unavailable state due to a local or remote SF on protection, then the FS SHALL cause the LER to go into remote Protecting administrative state; if in Unavailable state due to local SF, begin transmitting an SF(0,1) message.

With:

- o A remote Forced Switch message SHALL be ignored by the PSC Control logic when in Unavailable state as a result of a (local or remote) Lockout of protection. If in Unavailable state due to a local or remote SF on protection, then the FS SHALL cause the LER to go into remote Switching administrative state; if in Unavailable state due to local SF, begin transmitting an SF(0,1) message.

4.9. Updates to [Section 4.3.3.3](#). Protecting Administrative State

Replace the title of this section with "Switching Administrative State".

Replace the following text in the first paragraph:

In the Protecting administrative state, the user data traffic SHALL be transported on the protection path, while the working path is blocked due to an operator command, i.e., Forced Switch or Manual Switch.

With:

In the Switching administrative state, the user data traffic SHALL be transported on either the protection path or working path, depending on an operator command. If FS or MS-P command is in effect, the working path is blocked and the traffic SHALL be transported on the protection path. If MS-W command is in effect, the protection path is blocked and the traffic SHALL be transported on the working path.

Replace the reaction to local input list with:

- o A local Clear SHALL be ignored if in remote Switching administrative state. If in local Switching administrative state due to local FS or MS-P, then this input SHALL cause the LER to go into Normal state when the LER is configured for revertive behavior, or Do-not-Revert State when the LER is configured for non-revertive behavior. If in local Switching administrative state due to local MS-W, then this input SHALL cause the LER to go into Normal state.
- 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 remain in local Switching administrative state and transmit 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, if the current state is due to a (local or remote) MS-P or MS-W command. If the LER is in (local or remote) Switching administrative state due to an FS situation, then the SF on protection SHALL be ignored.
- o A local Signal Fail indication on the working path SHALL cause the LER to go into local Protecting failure state and begin transmitting an SF(1,1) message, if the current state is due to a (local or remote) MS-P or MS-W command. If the LER is in remote Switching administrative state due to a remote Forced Switch command, then this local indication SHALL cause the LER to remain in remote Switching administrative state and transmit an SF(1,1) message. If the LER is in local Switching administrative state due to a local Forced Switch command, then this indication SHALL be ignored (i.e., the indication should have been blocked by the Local Request logic).
- o A local Clear SF SHALL clear any local SF condition that may exist. If in remote Switching administrative state, the LER SHALL stop transmitting the SF(x,1) message and begin transmitting an NR(0,1) message.
- o A local Manual Switch to Protection input SHALL be ignored if in remote Switching administrative state due to a remote Forced Switch command. If the current state is due to a (local or remote) Manual Switch to Protection operator command, it SHALL cause the LER to remain in local Switching administrative state and transmit an MS(1,1) message. If the current state is due to a (local or remote) Manual Switch to Working operator command, the local MS-P SHALL be ignored.
- o A local Manual Switch to Working input SHALL be ignored if in remote Switching administrative state due to a remote Forced Switch command. If the current state is due to a (local or remote) Manual Switch to Working operator command, it SHALL cause the LER to remain in local Switching administrative state and transmit an MS(0,0) message. If the current state is due to a (local or remote) Manual Switch to Protection operator command, the local MS-W SHALL be ignored.
- o All other local inputs SHALL be ignored.

Replace the reaction to remote message list with:

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

message. It should be noted that this automatically cancels the current Forced Switch, Manual Switch to Protection or Manual Switch to Working command and data traffic is reverted to the working path, if required.

- o A remote Forced Switch message SHALL be ignored by the PSC Process logic if there is an active local Forced Switch operator command. If the Switching administrative state is due to a remote Forced Switch message, then the LER SHALL remain in remote Switching administrative state and continue transmitting the last message. If the Switching administrative state is due to either a local or remote Manual Switch to Protection or Manual Switch to Working command, then the LER SHALL remain in remote Switching administrative state (updating the state information with the proper relevant information) and begin transmitting an NR(0,1) message.
- o A remote Signal Fail message indicating a failure on the protection path SHALL cause the LER to go into remote Unavailable state and begin transmitting an NR(0,0) message, if the Switching administrative state is due to a Manual Switch to Protection or Manual Switch to Working command. It should be noted that this automatically cancels the current Manual Switch to Protection or Manual Switch to Working command, and data traffic is reverted to the working path, if required.
- o A remote Signal Fail message indicating a failure on the working path SHALL be ignored if there is an active local Forced Switch command. If the Switching administrative state is due to a local or remote Manual Switch to Protection or Manual Switch to Working, then the LER SHALL go to remote Protecting failure state and begin transmitting an NR(0,1) message.
- o A remote Manual Switch to Protection message SHALL be ignored by the PSC Control logic if in Switching administrative state due to a local or remote Forced Switch. If in Switching administrative state due to a remote Manual Switch to Protection, then the LER SHALL remain in remote Switching administrative state and continue transmitting the current message. If in local Switching administrative state due to an active Manual Switch to Protection, then the LER SHALL remain in local Switching administrative state and continue transmission of the MS(1,1) message. If in Switching administrative state due to a remote MS-W, then the LER SHALL remain in remote Switching administrative state, and begin transmitting an NR(0,1) message. If in Switching administrative state due to a local MS-W, then the remote MS-P message SHALL be ignored.

- o A remote Manual Switch to Working message SHALL be ignored by the PSC Control logic if in Switching administrative state due to a local or remote Forced Switch. If in Switching administrative state due to a remote MS-W, then the LER SHALL remain in remote Switching administrative state and continue transmission of an NR(0,0) message. If in Switching administrative state due to a local MS-W, then the remote MS-W message SHALL be ignored. If in Switching administrative state due to a remote MS-P, then the LER SHALL remain in remote Switching administrative state and begin transmitting an NR(0,0) message. If in Switching administrative state due to a local MS-P, then the LER SHALL go into remote Switching administrative state and begin transmitting an NR(0,0) message. It should be noted that this automatically cancels the current MS-P command.
- o A remote DNR(0,1) message SHALL be ignored if in local Switching administrative state. If in remote Switching administrative state due to a remote FS or MS-P, then the LER SHALL go to Do-not-Revert state and continue transmitting an NR(0,1) message. If in remote Switching administrative state due to a remote MS-W, then the remote DNR message SHALL be ignored.
- o A remote NR(0,0) message SHALL be ignored if in local Switching administrative state. If in remote Switching administrative state due to remote FS and there is no active local Signal Fail indication, then the LER SHALL go into Normal state and begin transmitting an NR(0,0) message. If there is a local Signal Fail on the working path, the LER SHALL go into local Protecting failure state and begin transmitting an SF(1,1) message. If in remote Switching administrative state due to remote MS-P or MS-W, then the LER SHALL go into Normal state and begin transmitting an NR(0,0) message. If in local Switching administrative state due to local MS-P or MS-W, then the remote NR(0,0) message SHALL be ignored.
- o All other remote messages SHALL be ignored.

4.10. Updates to [Section 4.3.3.4](#). Protecting Failure State

Replace the following bullet item in the reaction to local input list:

- o A local Forced Switch input SHALL cause the LER to go into Protecting administrative state and begin transmission of an FS(1,1) message.

With:

- o A local Forced Switch input SHALL cause the LER to go into Switching administrative state and begin transmission of an FS(1,1) message.

Replace the following bullet item in the reaction to remote message list:

- o A remote Forced Switch message SHALL cause the LER go into remote Protecting administrative state, and if in local Protecting failure state, the LER SHALL transmit the SF(1,1) message; otherwise, it SHALL transmit NR(0,1).

With:

- o A remote Forced Switch message SHALL cause the LER go into remote Switching administrative state, and if in local Protecting failure state, the LER SHALL transmit the SF(1,1) message; otherwise, it SHALL transmit NR(0,1).

4.11. Updates to [Section 4.3.3.5](#). Wait-to-Restore State

Replace the following bullet item in the reaction to local input list:

- o A local Forced Switch command SHALL send the Stop command to the WTR timer, go into local Protecting administrative state, and begin transmission of an FS(1,1) message.

With:

- o A local Forced Switch command SHALL send the Stop command to the WTR timer, go into local Switching administrative state, and begin transmission of an FS(1,1) message.

Replace the following bullet item in the reaction to local input list:

- o A local Manual Switch input SHALL send the Stop command to the WTR timer, go into local Protecting administrative state, and begin transmission of an MS(1,1) message.

With:

- o A local Manual Switch to Protection input SHALL send the Stop command to the WTR timer, go into local Switching administrative state, and begin transmission of an MS(1,1) message.

- o A local Manual Switch to Working input SHALL send the Stop command to the WTR timer, go into local Switching administrative state, and begin transmission of an MS(0,0) message.

Replace the following bullet item in the reaction to remote message list:

- o A remote Forced Switch message SHALL send the Stop command to the WTR timer, go into remote Protecting administrative state, and begin transmission of an NR(0,1) message.

With:

- o A remote Forced Switch message SHALL send the Stop command to the WTR timer, go into remote Switching administrative state, and begin transmission of an NR(0,1) message.

Replace the following bullet item in the reaction to remote message list:

- o A remote Manual Switch message SHALL send the Stop command to the WTR timer, go into remote Protecting administrative state, and begin transmission of an NR(0,1) message.

With:

- o A remote Manual Switch to Protection message SHALL send the Stop command to the WTR timer, go into remote Switching administrative state, and begin transmission of an NR(0,1) message.
- o A remote Manual Switch to Working message SHALL send the Stop command to the WTR timer, go into remote Switching administrative state, and begin transmission of an NR(0,0) message.

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

Replace the first paragraph:

Do-not-Revert state is a continuation of the Protecting failure state when the protection domain is configured for non-revertive behavior. While in Do-not-Revert state, data traffic SHALL continue to be transported on the protection path until the administrator sends a command to revert to Normal state. It should be noted that there is a fundamental difference between this state and Normal -- whereas Forced Switch in Normal state actually causes a switch in the transport path used, in Do-not-Revert state, the Forced Switch just switches the state (to Protecting administrative state) but the traffic would continue to

be transported on the protection path! To revert back to Normal state, the administrator SHALL issue a Lockout of protection command followed by a Clear command.

With:

Do-not-Revert state is a continuation of either the Protecting failure state or Switching administrative state due to Forced Switch or Manual Switch to Protection when the protection domain is configured for non-revertive behavior. While in Do-not-Revert state, data traffic SHALL continue to be transported on the protection path until the administrator sends a command to revert to Normal state. When the LER transitions into the Do-not-Revert state, the PSC Control Process SHALL check the persistent state of the local triggers to decide if it should further transition into a new state. If the result of this check is a transition into a new state, the LER SHALL transmit the corresponding message described in this section and SHALL use the data path corresponding to the new state. When the protection domain remains in Do-not-Revert state, the end point SHALL transmit an DNR(0,1) message if the state is local, or an NR(0,1) message if the state is remote, indicating -- Nothing to report and data traffic is being transported on the protection path.

Replace the following bullet item in the reaction to local input list:

- o A local Forced Switch command SHALL cause the LER to go into local Protecting administrative state and begin transmission of an FS(1,1) message.

With:

- o A local Forced Switch command SHALL cause the LER to go into local Switching administrative state and begin transmission of an FS(1,1) message.

Replace the following bullet item in the reaction to local input list:

- 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.

With:

- o A local Manual Switch to Protection input SHALL cause the LER to go into local Switching administrative state and begin transmission of an MS(1,1) message.
- o A local Manual Switch to Working input SHALL cause the LER to go into local Switching administrative state and begin transmission of an MS(0,0) message.

Replace the following bullet item in the reaction to remote message list:

- 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.

With:

- o A remote Forced Switch message SHALL cause the LER to go into remote Switching administrative state and begin transmission of an NR(0,1) message.

Replace the following bullet item in the reaction to remote message list:

- 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.

With:

- o A remote Manual Switch to Protection message SHALL cause the LER to go into remote Switching administrative state and begin transmission of an NR(0,1) message.
- o A remote Manual Switch to Working message SHALL cause the LER to go into remote Switching administrative state and begin transmission of an NR(0,0) message.

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

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

Part 1: Local input state machine

+	-----+	-----+	-----+	-----+	-----+	-----+	-----+
	OC	LO	SF-P	FS	SF-W	SFc	
+	-----+	-----+	-----+	-----+	-----+	-----+	-----+
N				SA:F:L			

UA:LO:L						
UA:P:L				SA:F:L		
UA:LO:R						
UA:P:R				SA:F:L		
PF:W:L				SA:F:L		
PF:W:R				SA:F:L		
SA:F:L	[20]					
SA:MW:L	N	UA:LO:L	UA:P:L	SA:F:L	PF:W:L	i
SA:MP:L	[20]			SA:F:L		
SA:F:R				SA:F:L		
SA:MW:R	i	UA:LO:L	UA:P:L	SA:F:L	PF:W:L	i
SA:MP:R				SA:F:L		
WTR				SA:F:L		
DNR				SA:F:L		

	MS-W	MS-P	WTRExp
N	SA:MW:L	SA:MP: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		
SA:F:L	i		
SA:MW:L	i	i	i
SA:MP:L	i		
SA:F:R	i		
SA:MW:R	SA:MW:L	i	i
SA:MP:R	i	SA:MP:L	
WTR	i	SA:MP:L	
DNR	SA:MW:L	SA:MP:L	

Part 2: Remote messages state machine

	LO	SF-P	FS	SF-W	MS-W	MS-P
N			SA:F:R		SA:MW:R	SA:MP:R
UA:LO:L					i	
UA:P:L					i	
UA:LO:R					i	
UA:P:R			SA:F:R		i	

PF:W:L			SA:F:R		i	
PF:W:R			SA:F:R		i	
SA:F:L					i	
SA:MW:L	UA:LO:R	UA:P:R	SA:F:R	[13]	i	i
SA:MP:L			SA:F:R		SA:MW:R	
SA:F:R					i	
SA:MW:R	UA:LO:R	UA:P:R	SA:F:R	[13]	i	SA:MP:R
SA:MP:R			SA:F:R		SA:MW:R	
WTR			SA:F:R		SA:MW:R	SA:MP:R
DNR			SA:F:R		SA:MW:R	SA:MP:R
+-----+-----+-----+-----+-----+-----+						

+-----+-----+-----+-----+			
	WTR	DNR	NR
+-----+-----+-----+-----+			
N			
UA:LO:L			
UA:P:L			
UA:LO:R			
UA:P:R			
PF:W:L			
PF:W:R			
SA:F:L			
SA:MW:L	i	i	i
SA:MP:L			
SA:F:R			
SA:MW:R	i	i	i
SA:MP:R			
WTR			
DNR			
+-----+-----+-----+-----+			

Replace the following item in the footnotes for the table:

[4] Remain in the current state (PA:F:R) and transmit SF(1,1).

[8] Remain in PA:F:R and transmit NR(0,1).

[19] Transition to PA:F:R and send SF (0,1).

With:

[4] Remain in the current state (SA:F:R) and transmit SF(1,1).

[8] Remain in SA:F:R and transmit NR(0,1).

[19] Transition to SA:F:R and send SF(0,1).

Add the following item in the footnotes for the table:

[20] If domain configured for revertive behavior transition to N,
else transition to DNR.

5. Security considerations

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

6. IANA considerations

This document makes no request of IANA.

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

7. Acknowledgements

8. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC4427] Mannie, E. and D. Papadimitriou, "Recovery (Protection and Restoration) Terminology for Generalized Multi-Protocol Label Switching (GMPLS)", [RFC 4427](#), March 2006.
- [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.

Authors' Addresses

Taesik Cheung
ETRI
218 Gajeongno
Yuseong-gu, Daejeon 305-700
South Korea

Phone: +82-42-860-5646
Email: cts@etri.re.kr

Alessandro D'Alessandro
Telecom Italia
via Reiss Romoli, 274
Torino 10141
Italy

Phone: +39 011 2285887
Email: alessandro.dalessandro@telecomitalia.it

Huub van Helvoort
Huawei Technologies
Karspeldreef 4
Amsterdam 1101 CJ
The Netherlands

Phone: +31 20 4300832
Email: huub.van.helvoort@huawei.com

