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JWT Report on MPLS Architectural Considerations for a Transport Profile
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Abstract

This RFC archives the report of the IETF - ITU-T Joint Working Team (JWT) on the application of MPLS to Transport Networks. The JWT recommended of Option 1: The IETF and the ITU-T jointly agree to work together and bring transport requirements into the IETF and extend IETF MPLS forwarding, OAM, survivability, network management and control plane protocols to meet those requirements through the IETF Standards Process. There are two versions of this RFC. An ASCII version that contains a summary of the slides and a pdf version that contains the summary and a copy of the slides.

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1. Introduction

For a number of years the ITU-T has been designing a label switched protocol to be used in Transport Networks. A Transport Network can be considered to be the network that provides wide area connectivity upon which other services such IP, or the phone network run. The ITU-T chose to adapt the IETF's MPLS to this task, and introduced a protocol suite known as T-MPLS.

Quite late in the ITU-T design and specification cycle, there were a number of liaison exchanges between the ITU-T and the IETF concerning this technology [[T-MPLS1](#)], and the chairs of the MPLS, PWE3, BFD and CCAMP working groups as well as the Routing and Internet Area Directors attended a number of ITU-T meetings. During this process the IETF became increasingly concerned that the incompatibility of IETF MPLS and ITU-T T-MPLS would lead to a "train wreck on the Internet". These concerns led the chairs of the IESG and IAB to take the step of sending a liaison to the ITU-T, stating that either T-MPLS should become and fully compliant MPLS protocol, standardized under the IETF process (the so called "Option 1"), or it should become a completely disjoint protocol with a new name and completely new set of code points (the so called "Option 2") [[Ethertypes](#)].

Option 1 and Option 2 were discussed at an ITU-T meeting of Question 12 Study Group 15 in Stuttgart [[Stuttgart](#)], where it was proposed that a Joint (ITU-T - IETF) Team should be formed to evaluate the issues, and make a recommendation to ITU-T management on the best way forward.

Following discussion between the management of the IETF and the ITU-T a Joint Working Team (JWT) was established, this was supported by an IETF Design Team and an Ad Hoc Group on T-MPLS in the ITU-T [[ahtmps](#)]. The first meeting of the Ad Hoc group occurred during the ITU-T Geneva Plenary in February this year. As a result of the work of the JWT and the resulting agreement on a way forward, the fears that a set of next-generation network transport specifications

developed by ITU-T could cause interoperability problems were allayed.

The JWT submitted their report to ITU-T and IETF management in the form of a set of powerpoint slides [[MPLS-TP-22](#)] [ALSO INCLUDE SELF REF TO PDF WHEN AVAILABLE]. The ITU-T have accepted this recommendation, as documented in [[MPLS-TP](#)]. This RFC archives the JWT report in a format that is accessible to the IETF.

There are two versions of this RFC. An ASCII version that contains a summary of the slides and a pdf version that contains the summary and a copy of the slides. In the case of a conflict between the summary

and the slides, the slides have normacy. Since those slides were the basis of an important agreement between the the IETF and the ITU-T, it should further be noted that In the event that the pdf version of the slides differ from those emailed to ITU-T and IETF management on 18th April 2008 by the co-chairs of the JWT, the emailed slides have normacy.

[2.](#) Executive Summary

Slides 4 to 10 provide an executive summary of the JWT Report. The following is a summary of those slides:

The JWT acheived consensus on the recommendation of Option 1: to jointly agree to work together and bring transport requirements into the IETF and extend IETF MPLS forwarding, OAM, survivability, network management and control plane protocols to meet those requirements through the IETF Standards Process. The Joint Working Team believed that this would fulfill the mutual goal of improving the functionality of the transport networks and the internet and guaranteeing complete interoperability and architectural soundness. This technolgy would be refered to as the Transport Profile for MPLS (MPLS-TP)

The JWT recommend that future work should focus on:

In the IETF:

Definition of the MPLS "Transport Profile" (MPLS-TP)

In the ITU-T:

Integration of MPLS-TP into the transport network

Alignment of the current T-MPLS Recommendations with MPLS-TP and,

Terminate the work on current T-MPLS

The technical feasibility analysis demonstrated there were no "show stopper" issues in the recommendation of Option 1 and that the IETF MPLS and Pseudowire architecture could be extended to support transport functional requirements. Therefore the team believed that there was no need for the analysis of any other option.

The JWT proposed that the MPLS Interoperability Design Team (MEAD Team), JWT and ad hoc T-MPLS groups continue as described in SG15 TD515/PLEN [[JWTcreation](#)] with the following roles:

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Facilitate the rapid exchange of information between the IETF and ITU-T

Ensure that the work is progressing with a consistent set of priorities

Identify gaps/inconsistencies in the solutions under development

Propose solutions for consideration by the appropriate WG/Question

Provide guidance when work on a topic is stalled or technical decision must be mediated

None of these groups would have the authority to create or modify IETF RFCs or ITU-T Recommendations. Any such work would be progressed via the normal process of the respective standards body. Direct participation in the work by experts from the IETF and ITU-T would be required.

The JWT recommended that the normative definition of the MPLS-TP that supports the ITU-T transport network requirements will be captured in IETF RFCs. It proposed that the ITU-T should:

Develop Recommendations to allow MPLS-TP to be integrated with current transport equipment and networks Including in agreement with the IETF, the definition of any ITU-T specific functionality within the MPLS-TP architecture via the MPLS change process ([RFC 4929](#))

Revise existing Recommendations to align with MPLS-TP

ITU-T Recommendations will make normative references to the appropriate RFCs

The executive summary contains a number of detailed recommendations to both IETF and ITU-T management together with proposed document structure and timetable.

These recommendations were accepted by ITU-T management [REF]

[3.](#) Introduction and Background Material

Slides 11 to 22 provide introductory and background material.

The starting point of the analysis was to attempt to satisfy option 1 by showing the high level architecture, any show stoppers and the design points that would need to be addressed after the decision has

been made to work together. Option 1 was stated as preferred by the IETF and because Option 1 was shown to be feasible, Option 2 was not explored.

The work was segmented into five groups looking at: Forwarding, OAM, Protection, Control Plane and Network Management. The outcome of each review was reported in following sections and is summarised below.

There followed a detailed description of the overall requirements and architectural assumptions that would be used in the remainder of the work.

[4.](#) High Level Architecture

Slides 23 to 28 provide a high level architectural view of the proposed design.

The spectrum of services that MPLS-TP needs to address and the wider MPLS context is described, together with the provisioning issues. Some basic terminology needed to understand the MPLS-TP is defined and some context examples provided.

[5.](#) OAM and Forwarding

Slides 29 to 32 describe the OAM requirements and talk about segment recovery and node identification.

Slides 33 to 38 introduce OAM hierarchy and describe LSP monitoring, the MEP and MIP relationship and the LSP and PW monitoring relationship.

Sides 39 to 46 introduce the Associated Channel Header and its generalisation to carry the OAM over LSPs through the use of the "Label for You" (LFU).

Slides 47 to 48 provide a didactic description of how the forwarding and the ACH OAM mechanism work in detail. A significant number of scenarios are described to work through the operation on a case by case basis. These slides introduce a new textual notation to simplify the description of complex MPLS stacks.

Note that the MPLS forwarding, as specified by the IETF RFCs, requires no changes to support MPLS-TP

[6.](#) Control Plane

Sides 79 to 83 discuss various aspects of the control plane design.

Control plane sub-team stated that existing IETF protocols can be used to provide required functions for transport network operation and DCN/SCN operation. IETF GMPLS protocols have already applied to ASON architecture, and the JWT considered that any protocol

extensions needed will be easy to make. The slides provide a number of scenarios to demonstrate this conclusion.

7. Survivability

The survivability considerations are provided in slides 95 to 104

Survivability sub-team did not find any issues that prevented the creation of an MPLS-TP, and therefore recommended that Option 1 be selected. Three potential solutions were identified. Each solution has different attributes and advantages, and thought that further work in the design phase should eliminate one or more of these options and/or provide an applicability statement.

After some clarifications and discussion there follow in the slide set a number of linear and ring protection scenarios with examples of how they might be addressed.

8. Network Management

Slide 106 States the conclusion of the Network Management sub team : that they found no issues that prevent the creation of an MPLS-TP and hence Option 1 can be selected.

9. Summary

Slide 113 Provides a summary of the JWT report.

The JWT found no show stoppers and everyone was in agreement that they had identified a viable solution. They therefore recommend Option 1. They stated that in their view it is technically feasible that the existing MPLS architecture can be extended to meet the requirements of a Transport profile, and that the architecture allows for a single OAM technology for LSPs, PWs and a deeply nested network. From probing various ITU-T Study Groups and IETF Working Groups it appears that MPLS reserved label 14 has had wide enough implementation and deployment that the solution may have to use a

different reserved label (e.g. Label 13). The JWT recommended that

extensions to Label 14 should cease.

The JWT further recommended that this architecture appeared to subsume Y.1711 since the requirements can be met by the mechanism proposed in their report.

10. IANA considerations

There are no IANA considerations that arise from this draft.

Any IANA allocations needed to implement the JWT recommendation will be requested in the standards track RFCs that define the MPLS-TP protocol.

11. Security Considerations

The only security consideration that arises as a result of this RFC is the need to ensure that this is a faithful representation of the JWT report.

The protocol work that arises from this agreement will have technical security requirements which will be identified in the RFCs that define MPLS-TP.

12. The JWT Report

In the PDF version of this RFC [REF to PDF VERSION] there follows the JWT report as a set of slides.

[13.](#) References

[13.1.](#) Informative References

[13.2.](#) URL References

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[T-MPLS1] IETF and ITU-T, "Various ITU-T and IETF Liaison Statements Concerning T-MPLS, <https://datatracker.ietf.org/liaison/>".

[ahmpls] "Ad Hoc group on T-MPLS, <http://www.itu.int/ITU-T/studygroups/com15/ahmpls.html>", 2008.

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