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                                                       June 24, 2010

                        "The OAM Acronym Soup"
                draft-ietf-opsawg-mpls-tp-oam-def-06.txt

Abstract

   At first glance the acronym "OAM" seems to be well known and well
   understood. Looking at the acronym a bit more closely reveals a set
   of recurring problems that are revisited time and again.

   This document provides a definition of the acronym OAM (Operations,
   Administration, and Maintenance) for use in all future IETF documents
   that refer to OAM. In particular, it will be applied in all MPLS
   Transport Profile (MPLS-TP) documents.

   This document is a product of a joint Internet Engineering Task Force
   (IETF) / International Telecommunication Union Telecommunication
   Standardization Sector (ITU-T) effort to include an MPLS Transport
   Profile within the IETF MPLS and PWE3 architectures to support the
   capabilities and functionalities of a packet transport network.

   This Informational Internet-Draft is aimed at achieving IETF
   Consensus before publication as an RFC and will be subject to an IETF
   Last Call.

   [RFC Editor, please remove this note before publication as an RFC and
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   RFC has IETF Consensus.]

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   This Internet-Draft is submitted in full conformance with the
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1. Introduction

The main purpose of this document is to provide a definition of the
OAM acronym such that it is useful for MPLS. However, the
information in this document is not specific to MPLS, so broader
applicability of the OAM definitions provided is appropriate.

The acronym OAM is frequently used in the data and telecommunication
industry. One would assume that something that is so widely used is
very clearly defined. However a closer look reveals some points that
need to be clarified.

The examples below show a number of different ways that the OAM
acronym has been expanded in previous documents. The examples come
from many sources including some of the early MPLS-TP I-Ds.

o OAM = Operation, Administration, Maintenance

o OAM = Operations, Administration, Maintenance

o OAM = Operations, Administration, and Maintenance

o OAM = Operations, Administration, Management

o OAM = Operations and Maintenance

o OAM = Operations and Management

o O&M = Operations and Maintenance

o O&M = Operations and Management

       o O&M = OAM and Management

       Sometimes there is a fourth letter added to the acronym:

       o OAM and P = Operations, Administration, Maintenance and
          Provisioning

       If such an important piece of our technology is so poorly defined, or
       if there are dialects of the technology with different understandings
       of such a key concept, this will eventually cause problems.

       Trying to understand the use of an acronym that is as "content-rich"
       as OAM reveals two levels of complexity. First, each letter in the
       acronym represents an integrated piece of functionality; secondly the
       acronym as such represents something that is more than just the sum
       of its parts.

       There is also the issue of how each piece of the acronym is defined.
       This document provides an analysis of how each piece of the acronym
       is defined and provides possible interpretations of the acronym.
       Finally the interpretation of the OAM acronym to use for the MPLS-TP
       effort based on the agreement reached in the JWT (Joint Working Team)
       report [1] is provided.

       Another useful document to make the OAM term understandable in a
       wider scope is found in An Overview of Operations, Administration,
       and Maintenance (OAM) Mechanisms [2].

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       capabilities and functionalities of a packet transport network.

[2](#).   OAM and O, A and M

[2.1](#).   OAM as a Functional Unit

   Operations And Maintenance (OAM): A group of network management
   functions that provide network fault indication, performance
   information, and data and diagnosis functions. ATM OAM ITU-T I.610
   [4] is an example specification that uses this expansion of the OAM
   acronym.

   Operations, Administration, and Maintenance (OAM): A group of network
   management functions that provide network fault indication, fault
   localization, performance information, and data and diagnosis
   functions. Examples where this acronym is used are Clause 57 of IEEE
   802.3-2008 [3] and ITU-T Y.1731 [8].

The ITU-T M.3010 [7] Recommendation defines operations systems
function as a function block that processes information related to
the telecommunications management for the purpose of monitoring/
coordinating and/or controlling telecommunication functions including
management functions (i.e. the TMN (Telecommunications Management
Network) itself).

The Metro Ethernet Forum refers to OAM as the tools and utilities to
install, monitor and troubleshoot a network, helping carriers run
their networks more effectively MEF 17 [9].

2.2. The Acronym Broken Up

2.2.1. O in OAM

The O in the OAM acronym invariably stands for "Operations".

However there is some ambivalence in the definition and scope of the
term "Operation".

Examples of tools related to "operations" are performance monitoring
tools used for service level agreement (SLA) measurement, fault
management tools used to monitor the health of nodes and links in the
network, and network provisioning tools.

2.2.2. A in OAM

The A in the OAM acronym stands for "Administration".

Examples of "administration" tools are network discovery and planning
tools.

2.2.3. M in OAM

In the list above the M in the OAM acronym stands for "Maintenance"
or "Management".

Maintenance and Management may have different interpretations.
Maintenance is defined further in Section 3, while Management is a
broader term applicable to many functions applied to the network as

described in [Section 3](#).

Since these terms have different interpretations, it is not a good idea to use them interchangeably. This document defines the "M" in the OAM acronym to mean Maintenance.

Examples of "maintenance" tools are implementations of connectivity check, loopback, link trace, and other tools that can be used to monitor and diagnose failures in a network or network element.

The Recommendation ITU-T M.20 [5] defines maintenance as the whole of operations required for setting up and maintaining, within prescribed limits, any element involved in the setting up of a connection (see the ITU-T M.60 [6] Recommendation). The purpose is to properly plan and program the maintenance operations required to establish and maintain a network.

A major aim of the concept of maintenance is to minimize both the occurrence and the impact of failures and to ensure that in case of a failure the correct actions are taken. The ITU-T documents also clearly define a maintenance philosophy.

3. Use of the OAM Acronym in the MPLS-TP effort

In [Section 4](#) the acronyms as they will be used in the MPLS-TP effort
are listed. This section gives some background on the definitions
provided.

"Mgt" will be used if an abbreviation for "Management" is needed.
This draft does not define Management. It is noted, however, that an
important part of management functionality relates to tools to report
the state of the network.

In MPLS-TP documents, the OAM acronym is to be used for "Operations,
Administration, and Maintenance", i.e. excluding provisioning.

OAM tools and protocols, and the "Management space" are complementary
in nature. Management focuses on FCAPS (Fault, Configuration,
Accounting, Provisioning, and Security) functionality and on manager
(or NOC (Network Operations Center)) to device (or network)
interaction.

From an architecture point of view OAM protocols and tools deployed
in the data plane tend to be "horizontal", i.e., network element to
network element. The management protocols tend to be "vertical",
i.e., between management stations and network elements.

From an architecture point of view OAM protocols and tools deployed
in the data plane tend to be "horizontal" i.e. network element to
network element while the management protocols tend to be "vertical".

The components of the OAM acronym (and provisioning) are defined as
follows:

o   Operations - Operation activities are undertaken to keep the
    network (and the services that the network provides) up and
    running. It includes monitoring the network and finding problems.
    Ideally these problems should be found before users are affected.

o   Administration - Administration activities involve keeping track
    of resources in the network and how they are used. It includes
    all the bookkeeping that is necessary to track networking
    resources and the network under control.

o   Maintenance - Maintenance activities are focused on facilitating
    repairs and upgrades - for example, when equipment must be
    replaced, when a router needs a patch for an operating system
    image, or when a new switch is added to a network. Maintenance
    also involves corrective and preventive measures to make the
    managed network run more effectively, e.g. adjusting device

configuration and parameters.

"Provisioning" is outside the scope of this document, but the
following definition is provided for completeness.

o   Provisioning - Provisioning activities involve configuring
    resources in the network to support the offered services. This
    might include setting up the network so that a new customer can
    receive an Internet access service.

In general, Provisioning is used to configure the network to provide
new services, whereas OAM is used to keep the network in a state that
it can support already existing services.

Sometimes it is necessary to talk about the combination of functions
and tools supplied by OAM and Management, it is preferred that this
is spelled out as "OAM and Management". In cases where an acronym is
needed O&M should be used.

[4](#). Acronyms for the MPLS-TP effort

   OAM - Operations, Administration, and Maintenance

   O&M - OAM and Management

   "Mgt" - Management

5. IANA Considerations

   This memo includes no request to IANA.

6. Security Considerations

   This document provides guidance for the use of the OAM acronym in
   other documents. This document does not have direct security
   implications.

   Misunderstanding of an acronym may lead to incorrect specification or
   implementation which may, in turn, open up security concerns with
   protocols or deployed networks. Clarifying the meaning of OAM is,
   therefore, a benefit for future stability of specifications.

7. Acknowledgments

   The following individuals significantly contributed to this document.

   o   Malcolm Betts from M. C. Betts Consulting Ltd.

   o   Kam Lam from Alcatel Lucent

   o   Dieter Beller from Alcatel Lucent

   Thanks to the experts of ITU-T SG 15 for their review and comments.

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