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              Concerns with the use of Proprietary Application Codes
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Abstract

   This document explains the terms Application Code and Application
   Identifier and points out a danger that exists when proprietary
   application codes are used.

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1. Introduction

   Application Code (AC) and Application Identifier (AI) are concepts
   and terms defined in the ITU-T. They have been used in at least two
   drafts in the IETF [SNMP][LMP] and it is quite possible they will be
   used in others. While the definitions of these concepts are not
   overly complicated it is important to understand them and to be aware
   of some subtleties in using them.

2. Requirements Language

   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 RFC 2119 [RFC2119].

3. Description and definition of AC and AI

   This section provides and discusses some descriptive and definitional
   material realted to AC and AI from ITU-T Recommendations.

3.1. AC

   ACs have been used in ITU-T Recommendations that specify optical
   interface parameters since at least the early 1990s. They are used
   in many of the ITU-T Recommendations referenced in CCAMP work e.g.
   G.957 [ITU-T_G.957], G.695 [ITU-T_G.695], G.698.1 [ITU-T_G.698.1] and
   G.698.2 [ITU-T_G.698.2].

ACs are explained in the ITU-T handbook 'Optical fibres, cables and systems' [ITU-T_OFCS]. ACs take into account 'the many possible combinations of channel counts, optical tributary signal types, span distances, fibre types and system configurations. The structure of these codes varies from one Recommendation to another, depending on the characteristics required to distinguish one application from another'. An indication of the bit rate and of the type of fibre employed is common to all ACs specified in ITU-T Recommendations.

ACs are perhaps best illustrated by example, in the handbook we find two examples:

From G.957 the AC 'L-16.2' wherein:

o L indicates a target distance of ~ 80kn (long reach)

o 16 indicates bit rate is STM-16 (2.48832 Gbits/s)

o 2 indicates G.652 fibre (in the 1550nm region)

And a more complicated example 'DN100C-2A(L)F' from G.698.2 wherein:

o D indicates DWDM

o N indicates narrow spectral excursion

o 100 indicates minimum channel spacing of 100GHz

o C indicates chromatic dispersion limits appropriate to a compensated link

o 2 indicates highest class of bit rate supported is NRZ 10G

o A indicates that the link may contain optical amplifiers

o 3 indicates G.653 fibre

o L indicates operating wavelength in the L band

o F indicates that FEC must be transmitted

3.2. AI

In contrast to venerable history of AC, which first appears in Recommendations under the responsiblity of Q6/15 in the 1990s, AI is a more modern creation of Q12/15 and appears first in G.872 [ITU-T_G.872] the 'Architecture of optical transport networks' in 2012.

In G.872 we find that 'the characteristic information of the OCh
layer network (is) an optical signal defined by a set of parameters.
The central frequency, required bandwidth and other analogue
parameters such as signal-to-noise ratio associated with the network
media channel are of particular interest. The parameters are
captured in an application identifier, which covers both standardized
as well as proprietary applications'. These parameters defining the
characteristic information of an optical signal are the same
parameters as were heretofore encoded in ACs; the difference is that
AI covers 'standard and proprietary applications'. In a footnote we
find the important qualification that 'an application identifier
applies to the transmitter, the network media channel and receiver
combination. It does not apply to a single interface'.

In G.874 [ITU-T_G.874], which is a management specification under the
responsibility of Q14/15 entitled 'Management aspects of optical
transport network elements', there is a clause describing management
of AIs. It states that G.872 has 'generalised Application Code to
Application Identifier so that proprietary (i.e. non standard)
applications can be handled'. There is still no definition of AI
here; for that we have to consult G.874.1 [ITU-T_G.874.1] the
'Optical transport network (OTN): Protocol-neutral management
information model for the network element view' where, in the UML
model supplied with that Recommendation we find:

   The syntax of ApplicationIdentifier is a
   pair{ApplicationIdentifierType, PrintableString}. The value of
   ApplicationIdentifierType is either STANDARD or PROPRIETARY. The
   value of PrintableString represents the standard application code
   as defined in the ITU-T Recommendations or a vendor-specific
   proprietary code.

This is the Holy Grail; from it we can draw some axioms which we list
below.

3.3. AC and AI axioms

Note that we also discuss proprietary codes (PC) in this section.

o An AI may contain an AC OR a PC.

o An AC is NOT the same as an AI.

o An AI is NOT the same as an AC.

o A PC is NOT the same as an AI.

o An AI is not the same as a PC.

   o ACs are defined in ITU-T standards and the corresponding AI would
      be {STANDARD, AC value}

   o By definition PCs are proprietary and not defined in standards
      but, the vendor specific values would be given as printable
      strings in an AI as {PROPRIETARY, PC value}.

[4](#). Using AIs

   The IETF specifies protocols; CCAMP in particular specifies protocols
   that are used to configure and control equipment containing optical
   interfaces that conform to ITU-T specifications. It is quite natural
   to imagine that routing, signaling or link management protocols, or
   extensions to such protocols, developed in CCAMP might need to encode
   parameters describing those optical interfaces. In the past using an
   AC would have been a natural choice to do that, now, with the
   specificaton of AI, using AI would seem to be a best practice.
   Indeed we see existence proof in some work in progress in CCAMP
   [SNMP][LMP] that AI is already being used.

   The IETF's work is used throughout the industry. Other bodies
   'profile' protocol specifications developed in IETF and use those
   profiles as building blocks for specification of implementation
   agreements designed to enable the development of multivendor
   interoperable systems. It is vital therefore that we consider the
   use of AI as currently specified from that perspective. In the
   following sections we consider the use of Standard and Proprietary
   ACs in AIs.

[4.1](#). Using AI containing a STANDARD AC

   When a protocol component receives or sends an AI containing the
   ApplicationIdentifierType set to STANDARD there is no ambiguity about
   the meaning or provenance of the PrintAble string the AI contains: It
   MUST be an AC defined in an ITU-T Recommendation. We note that,
   unfortunately, there is no single registry of ITU-T ACs, but there
   are a relatively small number of Recommendations that need to be
   examined to determine whether an AC identified in this way, i.e as
   standard, really is what it claims to be.

   The situation is not so clear cut for proprietary ACs which we
   consider next.

[4.2](#). Using AI containing a PROPRIETARY AC

   When a protocol component receives an AI containing the
   ApplicationIdentifierType set to PROPRIETARY there are two
   possibilities: it either recognizes the AC or it does not. We can

dismiss the second of these trivially; robust specifications of protocols contain instructions for handling unrecognised or incorectly formatted information elements. The first case, wherein the AC is recognised, might also seem straightforward - after all the AC has been 'recognised' - but it is not.

Because there is, beyond the fact that it is represented by a printable string, no definition of a proprietary code it is impossible for a protocol entity to distinguish between a PROPRIETARY AC that it believes to be one of its own (i.e sent by a protocol peer using the same proprietary list of PROPRIETARY ACs) and one sent from an implementation using a different proprietary list of ACs one of which is, unfortunately, identical. Proprietary ACs are not uniquely self identifying and a risk of collision exists. This means that they may not be used in a manner that requires them to be unique.

5. Discussion

AI is a relatively new concept that allows for representation of standard (ITU-T specified) and proprietary ACs. This is valuable and we believe that protocol specifications that need to communicate optical interface parameters should use AI henceforth.

This memo identifies a potential problem with the use of proprietary ACs wherein a 'collision' between ACs may occur. We believe such collisions to be dangerous and that they should be eliminated. How that is done is FFS but we note that the definition of AI is the responsibility of ITU-T SG15 and it is important that a solution be developed.

Until such time as a resolution to this problem has been achieved we believe that proprietary application codes should be considered dangerous and not used in a way that requires them to be unique i.e. not used at all. Standard ACs are not afflicted by this problem and may be used.

6. IANA Considerations

This memo includes no request to IANA.

7. Security Considerations

TBD

8. References

8.1. Normative References

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              Requirement Levels", BCP 14, RFC 2119, March 1997.

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8.2. Informative References

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