



The ATM Forum

Technical Committee

Loop Emulation Service Using AAL2 File Transfer Addendum

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Preface

This specification uses three levels for indicating the degree of compliance necessary for specific functions, procedures, or coding. They are indicated by the use of key words as follows:

- **Requirements:** "Shall" indicates a required function, procedures or coding necessary for compliance. In some cases "shall" used in text indicates a conditional requirement, since the operation described is dependent on whether or not an objective or option is chosen.
- **Objective:** "Should" indicates an objective which is not required for compliance, but which is considered desirable.
- **Option:** "May" indicates an optional operation without implying a desirability of one operation over another. That is, it identifies an operation that is allowed while still maintaining compliance.

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Contents

PREFACE	3
ACKNOWLEDGMENTS	3
CONTENTS	4
1 INTRODUCTION	5
2 OBJECTIVES	5
3 SCOPE	5
4 REFERENCES	6
5 FILE TRANSFER TO CP-IWF	6
5.1 TRANSPORT OF TFTP OVER THE LES-EOC.....	6
5.2 USAGE OF TFTP OVER THE LES-EOC.....	6

1 Introduction

This specification defines an optional method for transferring files from the CO-IWF function to the CP-IWF function, in support of the Loop Emulation Service Using AAL2 specified in af-vmoa-0145.000.

2 Objectives

The Customer Premises Inter-Working Function (CP-IWF) defined by af-vmoa-0145.000 is typically situated in a remote location, providing access to narrowband services over a broadband access network. Service providers need the ability to manage the CP-IWF function remotely, since the correct operation of this function is essential to the delivery of services.

The specification for Loop Emulation Service Using AAL2 defines a method for remote management of the CP-IWF which uses transmission of Simple Network Management Protocol (SNMP) Protocol Data Units (PDUs) over a specified AAL2 channel on the Virtual Circuit Connection (VCC) that exists between the CO-IWF (Central Office Inter-Working Function) and the CP-IWF. This channel is referred to as the “Loop Emulation Service Embedded Operations Channel” or LES-EOC.

Support for transmission of SNMP PDUs between CO-IWF and CP-IWF provides a means to manage many aspects of CP-IWF operation. However there is one requirement that it does not meet, which is the ability to transfer a file from the CO-IWF to the CP-IWF. For example, a file transfer capability is required in order to allow the software that implements the CP-IWF function to be updated. The capability could also be used to download a configuration file.

3 Scope

This specification defines the protocol operations that are necessary to support interoperable file transfer operations between a CO-IWF and a CP-IWF.

The following aspects of file transfer operations are considered out of the scope of this specification, even though they may impact interoperability:

- Naming conventions for files
- Basis of acceptance or rejection by the CP-IWF of a file transfer request
- Action taken by the CP-IWF following completion of file transfer operation
- Identification of file type, e.g. software image or configuration file
- Management of software images associated with the CP-IWF
- Management of file transfer traffic within the overall traffic characteristics of the AAL2 VCC

4 References

The following normative references apply to this specification.

1. ATM Forum af-vmoa-0145.000, 2000, Loop Emulation Service Using AAL2
2. IETF RFC1350, 1992, The TFTP Protocol (Revision 2)
3. IETF RFC1123, 1989, Requirements for Internet Hosts -- Application and Support

5 File Transfer to CP-IWF

CO-IWFs and CP-IWFs may support file transfer operations over the LES-EOC. If this capability is supported, CO-IWFs and CP-IWFs shall support the Trivial File Transfer Protocol (TFTP) over the LES-EOC as defined in this specification.

5.1 Transport of TFTP over the LES-EOC

The LES-EOC provides a transport for higher level protocol elements in the payload of the frame mode bearer service using AAL2 CID=9. An LES-EOC PDU is defined as a two-octet protocol identifier followed by the payload. When the LES-EOC is used to transport SNMP PDUs, the protocol identifier contains the value 0x814c and the payload contains the SNMP PDU.

The LES-EOC shall be used to transport TFTP, in which case the value 0x814b shall be used as the TFTP protocol identifier. The payload of LES-EOC PDU shall contain the TFTP PDU.

5.2 Usage of TFTP over the LES-EOC

TFTP over the LES-EOC shall use the packet format as defined in RFC1350, with the following limitations:

- The mode field in the WRQ/RRQ packet shall be set as “octet”
- TFTP transfer identifiers (TID) shall not be used

To transfer a file over the LES-EOC, the CO-IWF shall function as the TFTP originating host and the CP-IWF shall function as the TFTP responding host. The CO-IWF, as the originating host, may send or receive a file from the CP-IWF. A CP-IWF shall not originate TFTP requests. If the CP-IWF does not support file transfer, it shall ignore TFTP PDUs received over the LES-EOC.

A file transfer is initiated when the CO-IWF sends a WRQ or RRQ packet indicating a request to write or read a file, respectively. The WRQ or RRQ packet contains the file name. If the CP-IWF grants the request, the CP-IWF shall acknowledge a WRQ packet by sending an ACK or ERROR packet. Likewise the CP-IWF shall acknowledge an RRQ packet by sending a data or ERROR packet. The connection is then opened and the file is transferred in fixed blocks of 512 bytes.

Each data packet contains one block of data, and must be acknowledged by an ACK packet before the next packet can be sent. A data packet of less than 512 bytes signals termination of a transfer. If a packet gets lost, the intended receiving IWF will timeout and may retransmit its last packet, thus causing the sending IWF of the lost packet to retransmit that lost packet. The TFTP implementation shall use an adaptive timeout per RFC1123. At least an exponential back-off of retransmission timeout shall be applied.

Most errors shall cause termination of the connection. Sending an ERR packet signals an error. The ERR packet shall not be acknowledged nor retransmitted. A timeout shall be used to detect a termination when the ERR packet has been lost.

The LES-EOC supports only one TFTP session between the CO-IWF and the CP-IWF, and does not use the TFTP transfer identifier (TID) to distinguish between sessions. Consequently, any attempt to initiate a new session while an existing session is in progress must be rejected. Hence, if the CP-IWF receives a WRQ or RRQ from the LES-EOC while there is an ongoing TFTP session, it shall reject the request and terminate the ongoing TFTP session by sending an ERR packet. The Error Code shall be 4 with the meaning of “Illegal TFTP operation”. The text description is optional and, when included, should read “Illegal TFTP request during transmission”.