

Network Working Group
Internet Draft
Expiration Date: November 1999
Inc.

Mike O'Dell
Jed Kaplan
UUNET Technologies,

John Hayes
Ted Schroeder
Alteon WebSystems, Inc.

P.J. Singh
Packet Engines, Inc.

Daemon Morrell
Juniper Networks, Inc.

Jennifer Hsu

Extended Ethernet Frame Size Support

[draft-kaplan-isis-ext-eth-02.txt](#)

1. Status of this Memo

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2. Abstract

This document presents an extension to current Ethernet Frame standards to support payloads greater than 1500 Bytes for Ethernet_II and 802.3 frames. This is useful for Gigabit Ethernet technology, providing a means to carry large MTU packets without fragmentation

over a high-speed broadcast network.

3. Overview

There are two fundamental frame types defined for Ethernet: Ethernet II [[ETH](#)] [[RFC894](#)] and 802.3 [[IEEE802.3](#)]. 802.3 headers may be followed by a Logical Link Control header, 802.2 [[IEEE802.2](#)]. Both types of encapsulations can co-exist on the same media at the same time. Encodings for Ethernet II and 802.3 frames evolved such that, as long as payloads were less than 1500 bytes, Ethernet II frames could always be distinguished from IEEE 802.3 frames.

However, when the payload is greater than 1500 bytes frames may not be uniquely distinguishable as conforming to Ethernet II or 802.3 formats. This document extends the Ethernet frame format to allow Ethernet_II or 802.3 frame payloads larger than 1500 bytes to be uniquely distinguished.

4. Ethernet Frame Formats

A. Ethernet II

```
+-----+-----+-----+-----+-----+
| DA | SA | Type | Data | FCS |
+-----+-----+-----+-----+-----+
```

DA	Destination MAC Address	(6 bytes)
SA	Source MAC Address	(6 bytes)
Type	Protocol Type	(2 bytes)
Data	Protocol Data	(46 - 1500 bytes)
FCS	Frame Checksum	(4 bytes)

B. IEEE 802.3 and derivatives

```
+-----+-----+-----+-----+-----+
| DA | SA | Len | Data | FCS |
+-----+-----+-----+-----+-----+
```

DA	Destination MAC Address	(6 bytes)
SA	Source MAC Address	(6 bytes)
Len	Length of Data field	(2 bytes)
Data	Protocol Data	(46 - 1500 bytes)
FCS	Frame Checksum	(4 bytes)

The derivatives include LLC (802.2) and SNAP which prefix the data field with an LLC header. In these instances the Len field then corresponds to the combined size of both the data portion of the frame and the LLC header.

On reception, the two formats are differentiated based on the magnitude of the Type/Length field, as follows:

> 1500 bytes: value corresponds to a type field. The frame is an Ethernet II frame, with type values starting at 1536 (600 hex).

<= 1500 bytes: value corresponds to a length field. The frame is an IEEE 802.3 format (or derivative) with a maximum data length of 1500 bytes.

5. Problem with Large 802.3 Frames in the presence of Ethernet_II Frames

Some protocols commonly used in the Internet have no reserved Ethertype.

An example is the set of ISO Network layer protocols, of which ISIS is a member. Such protocols are only defined to use the IEEE 802.3/802.2 encoding, and so their packets are limited in length to 1500 bytes.

Ethernet_II frames have no length field. Protocols encapsulated in Ethernet II frames, such as IP, are not limited in length to 1500 bytes by framing.

6. Proposed Ethernet Frame Extension

Large 802.3 and Ethernet_II frames can be supported by the following:

- + Define an Ethertype for 802.3, 0x8870, and encode large frames (where the data field is greater than 1500 bytes), exclusive of the Destination MAC address, Source MAC address, and Data length fields, within Ethernet II.

Large 802.3/802.2 frames would have the following fields:

```
+---+---+---+---+---+---+---+---+
| DA | SA | Type | DSAP | SSAP | Ctrl | Data | FCS |
+---+---+---+---+---+---+---+---+
                        === 802.2 Header ===
```

DA	Destination MAC Address	(6 bytes)
SA	Source MAC Address	(6 bytes)
Type	0x8870 (Ethertype)	(2 bytes)
DSAP	802.2 Destination Service Access Point	(1 byte)
SSAP	802.2 Source Service Access Point	(1 byte)
Ctrl	802.2 Control Field	(1 byte)
Data	Protocol Data	(> 46 bytes)
FCS	Frame Checksum	(4 bytes)

- + Allow Ethernet II frames to have payloads greater than 1500 bytes.

There is no loss of information from 802.3/802.2 frames. Although the 802.3 length field is missing, the frame length is known by virtue of the frame being accepted by the network interface.

In this manner, all Ethernet II frames, including large 802.3 packets, can be longer than 1500 bytes, yet are uniquely identified.

7. References

[ETH] "The Ethernet - A Local Area Network", version 1.0, Digital Equipment Corporation, September 1980, and "The Ethernet, A Local Area Network" Data Link Layer and Physical Layer Specifications", Digital, Intel, and Xerox, November, 1982.

[RFC894] IETF [RFC 894](#)

[IEEE802.3] IEEE Std 802.3

[IEEE802] IEEE Std 802

[IEEE802.3Z] IEEE Std 802.3z

[EXT.FRAME] "Use of Extended Frame Sizes in Ethernet Networks", draft 2.1, Alteon Networks, Inc.

8. Author's Addresses

Mike O'Dell
UUNET an MCI WorldCom Company
3060 Willaims Drive
Fairfax, Va. 22031-4648
703-206-5890
email: mo@uu.net

Jed Kaplan
UUNET an MCI WorldCom Company
3060 Willaims Drive
Fairfax, Va. 22031-4648
914-701-5309
email: jkaplan@uu.net

John Hayes
Alteon WebSystems, Inc.
50 Great Oaks Blvd.
San Jose, CA 95119
408-360-5507
email: hayes@alteon.com

Ted Schroeder
Alteon WebSystems, Inc.
50 Great Oaks Blvd.
San Jose, CA 95119
408-360-5500

email: ted@alteon.com

P.J. Singh

Packet Engines, Inc.

11707 East Sprague #101

Spokane WA 99206

509-777-7000

email: pjsingh@packetengines.com

Daemon Morrell

Juniper Networks, Inc.

12343-D Sunrise Valley Drive

Reston, VA 20191

email: dmorrell@juniper.net

Jennifer Hsu

jhsu@mur.com