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United States Patent [19]

Fijolek et al.

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[54] **METHOD AND SYSTEM FOR ADDRESSING NETWORK HOST INTERFACES FROM A CABLE MODEM USING DHCP**

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[21] Appl. No.: **09/018,784**

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[52] U.S. Cl. **709/225**; 709/203; 709/202; 709/217; 709/218; 709/219; 709/226; 370/312; 370/352; 370/389; 370/432; 370/475; 348/6; 348/734; 359/164; 359/165; 364/705.05
[58] **Field of Search** 709/224, 203, 709/202, 217, 218, 219, 226, 227, 231, 238, 245; 711/200; 370/312, 352, 389, 432, 475; 364/705.05; 348/6, 734; 359/164, 165

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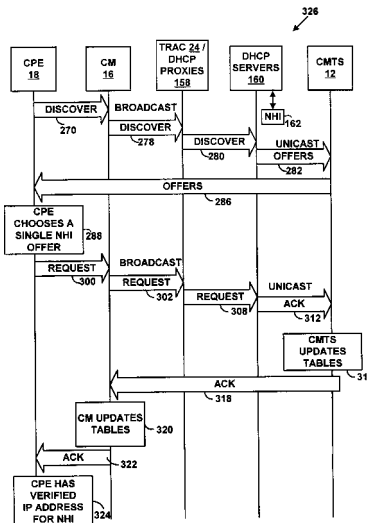
[57] **ABSTRACT**

A method and system are provided to allow a cable modem to discover an address of a network host interface on a cable television network to connect the cable modem to a data network (e.g., the Internet). The cable modem is used in a data-over-cable system with telephony return. The cable modem is connected to a cable television network over a downstream cable data channel and connected to a public switched telephone network over a serial telephone line. The method provides a way for the cable modem to determine the address of network host interfaces (e.g., Internet Protocol hosts) available on the cable television system via the upstream channel connected to public switched telephone network. The method includes using existing Dynamic Host Configuration Protocol ("DHCP") messages and message fields to discover network host interfaces available on the cable television system even though the cable modem only has downstream connection from the cable television network. The method and are used without changes to DHCP and can also be used in a data-over-cable system without telephony return.

25 Claims, 23 Drawing Sheets

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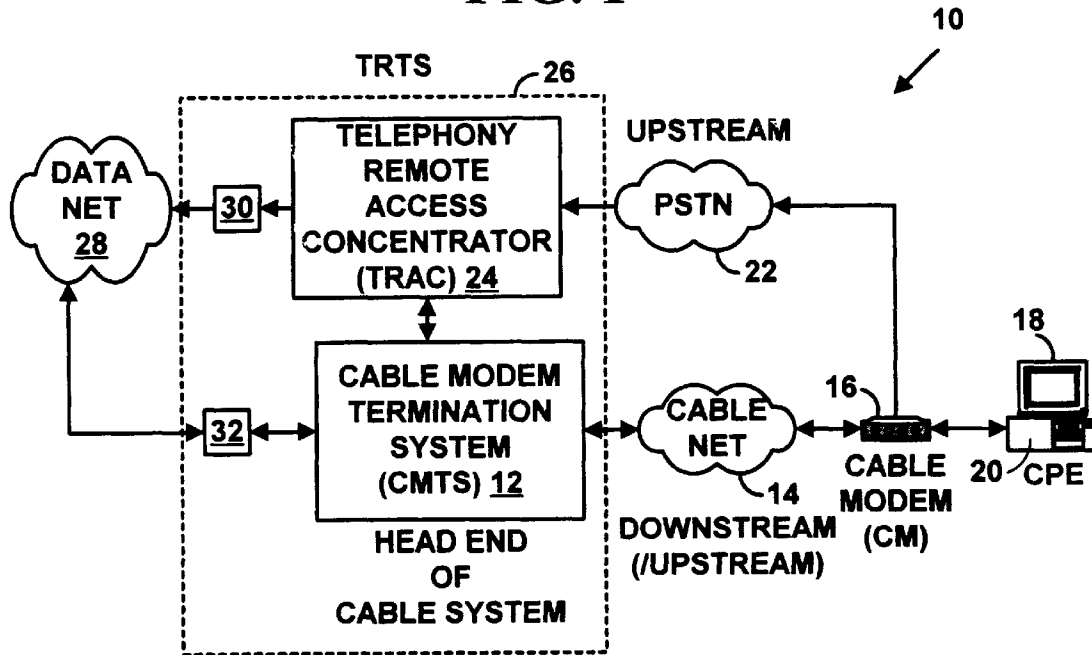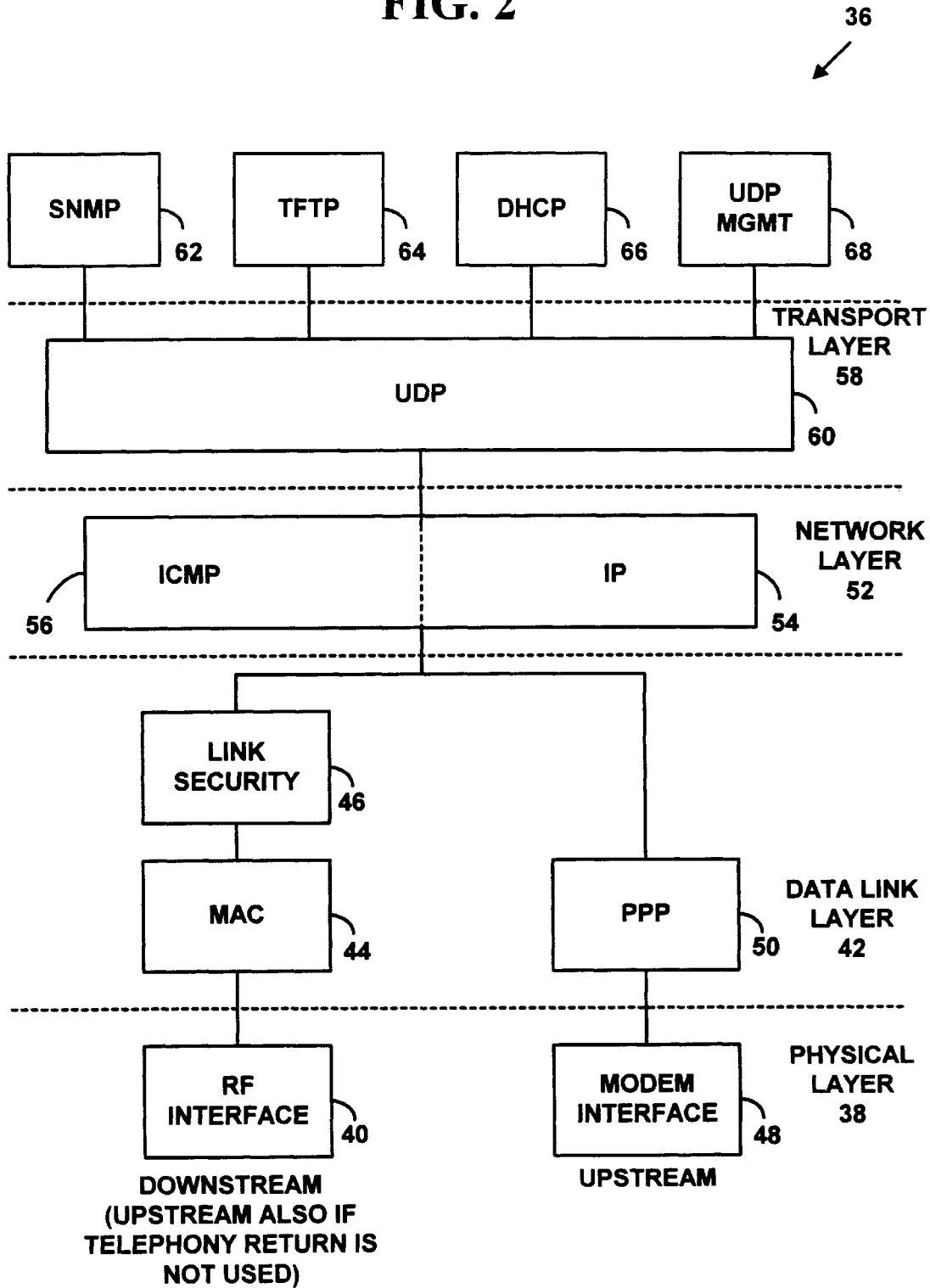
FIG. 1
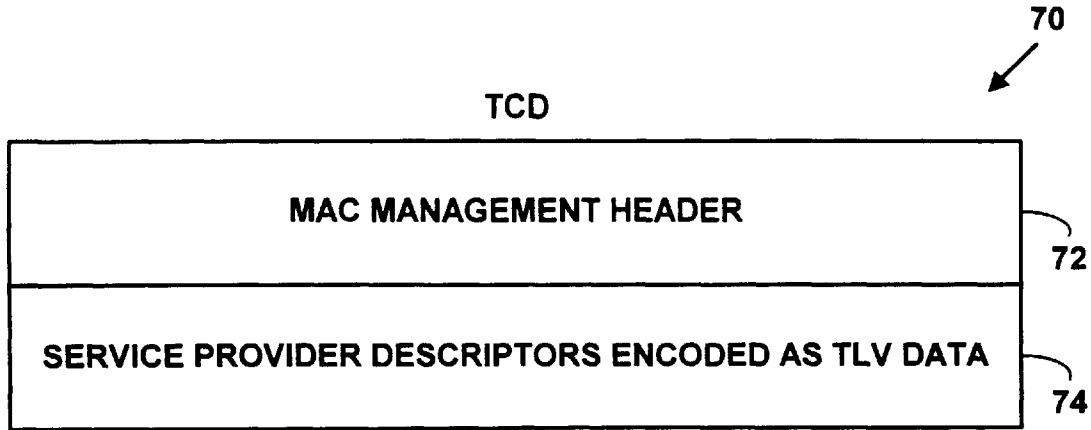
10

TRTS — 26

UPSTREAM

TELEPHONY
REMOTE
ACCESS
CONCENTRATOR
(TRAC) 24

DATA
NET
28

30

PSTN

22

18

CABLE MODEM
TERMINATION
SYSTEM
(CMTS) 12

32

CABLE
NET

16

CABLE
MODEM
(CM)

20 CPE

HEAD END
OF
CABLE SYSTEM

14

DOWNSTREAM
(/UPSTREAM)

FIG. 2

36

| SNMP 62 | TFTP 64 | DHCP 66 | UDP MGMT 68 |

TRANSPORT
LAYER
58

| UDP 60 |

NETWORK
LAYER
52

| ICMP 56 | IP 54 |

| LINK SECURITY 46 |

| MAC 44 | | PPP 50 |

DATA LINK
LAYER
42

| RF INTERFACE 40 | | MODEM INTERFACE 48 |

PHYSICAL
LAYER
38

DOWNSTREAM
(UPSTREAM ALSO IF
TELEPHONY RETURN IS
NOT USED)

UPSTREAM

FIG. 3

70

TCD

| MAC MANAGEMENT HEADER | 72 |
| SERVICE PROVIDER DESCRIPTORS ENCODED AS TLV DATA | 74 |

FIG. 4

76

TSI

MAC MANAGEMENT HEADER	78
DOWNSTREAM CABLE CHANNEL IP ADDRESS	80
REGISTRATION IP ADDRESS	82
CMTS BOOT TIME	84

DOWNSTREAM CHANNEL ID	EPOCH	VENDOR SPECIFIC ENCODED AS TLV DATA
86	88	90

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