US006208721B1

(12) **United States Patent**
Feinberg et al.

(10) **Patent No.: US 6,208,721 B1**
(45) **Date of Patent: Mar. 27, 2001**

(54) **METHOD AND APPARATUS FOR IDENTIFYING TELEPHONE CALLERS WHO HAVE BEEN UNSUCCESSFUL IN REACHING A CALLED DESTINATION**

(75) Inventors: **Brion Noah Feinberg**, Morganville; **Carol H. Welch**, Morristown, both of NJ (US)

(73) Assignee: **Lucent Technologies Inc.**, Murray Hill, NJ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/235,435**

(22) Filed: **Jan. 22, 1999**

(51) **Int. Cl.**[7] **H04M 15/00**
(52) **U.S. Cl.** **379/134**; 379/111; 379/113; 379/134
(58) **Field of Search** 379/111–115, 120–121, 379/127, 133–134, 201, 207, 265–266, 309, 34, 37

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,408,100	*	10/1983	Pritz et al.	379/67
4,788,718	*	11/1988	McNabb et al.	379/113
4,924,491	*	5/1990	Compton et al.	379/37
5,509,055	*	4/1996	Ehrlich et al.	379/133
5,859,903	*	1/1999	Lee	379/157
5,999,604	*	12/1999	Walter	379/133

OTHER PUBLICATIONS

Patent No. 5,311,574, filed on Oct. 23, 1991 and issued on May 10, 1994 to Konstantin Livanos. Class: 379/88.
Patent No. 5,530,741, filed on Nov. 23, 1993 and issued on Jun. 25, 1996 to Robert M. Rubin. Class: 379/142.

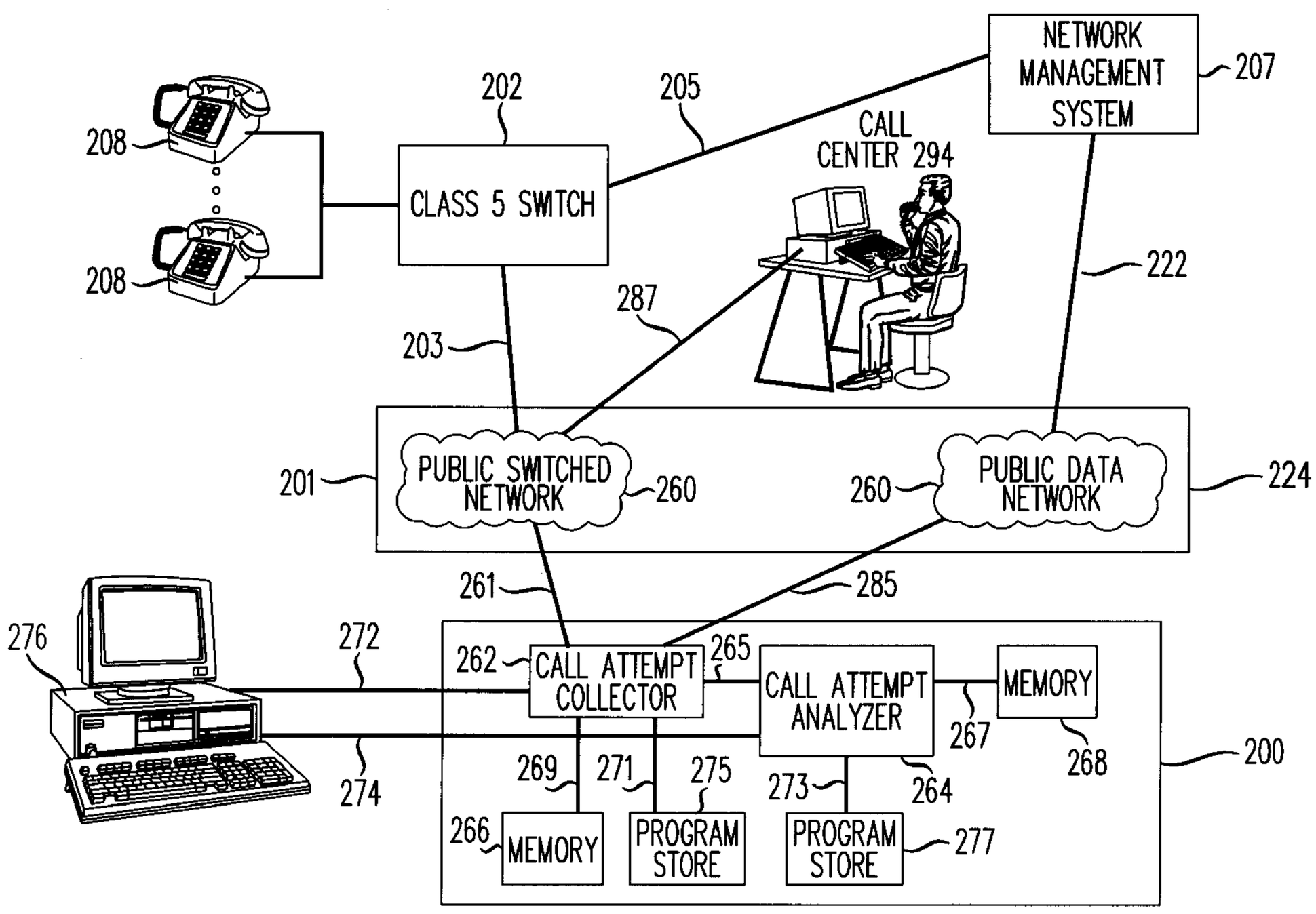
* cited by examiner

Primary Examiner—Duc Nguyen
(74) *Attorney, Agent, or Firm*—F. Luludis; T. J. Bean

(57) **ABSTRACT**

A system identifies calling parties who are unable to successfully complete calls to a called party. Call attempt failure records are retrieved from a local exchange carrier that services the calling parties, from a local exchange carrier that services the called party, and from an interexchange carrier that carries calls between the two local exchanges. Call completion records are retrieved from the local exchange carrier serving the called party. The failure records are compared to the completion records to determine which calling parties experienced one or more failed call attempt to the called party, and of these calling parties, which parties also failed to complete subsequent call attempts to the called party. The system also reports the intensity of calls made by these parties to the called party over a specified time period.

15 Claims, 8 Drawing Sheets



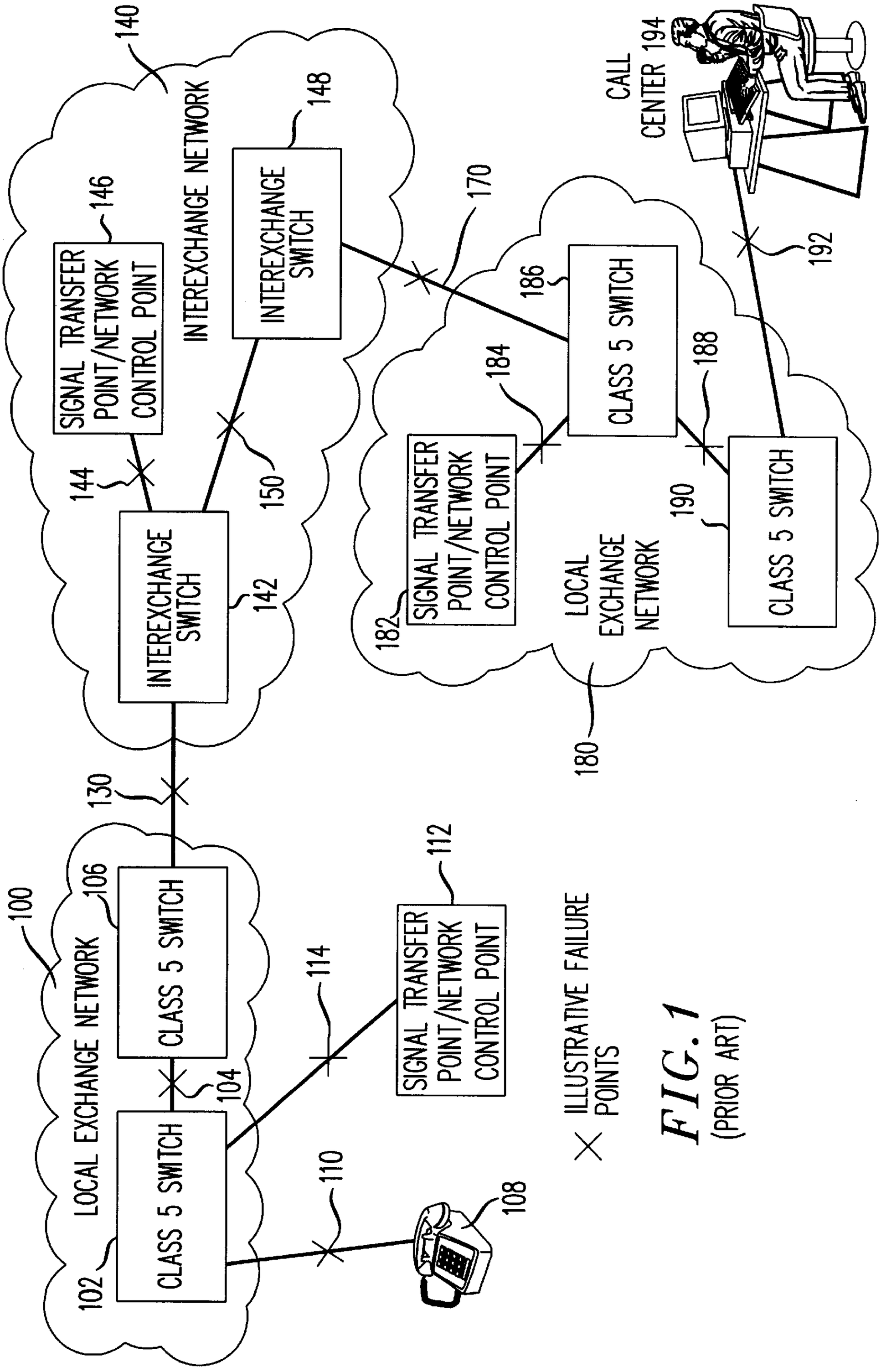


FIG. 1
(PRIOR ART)

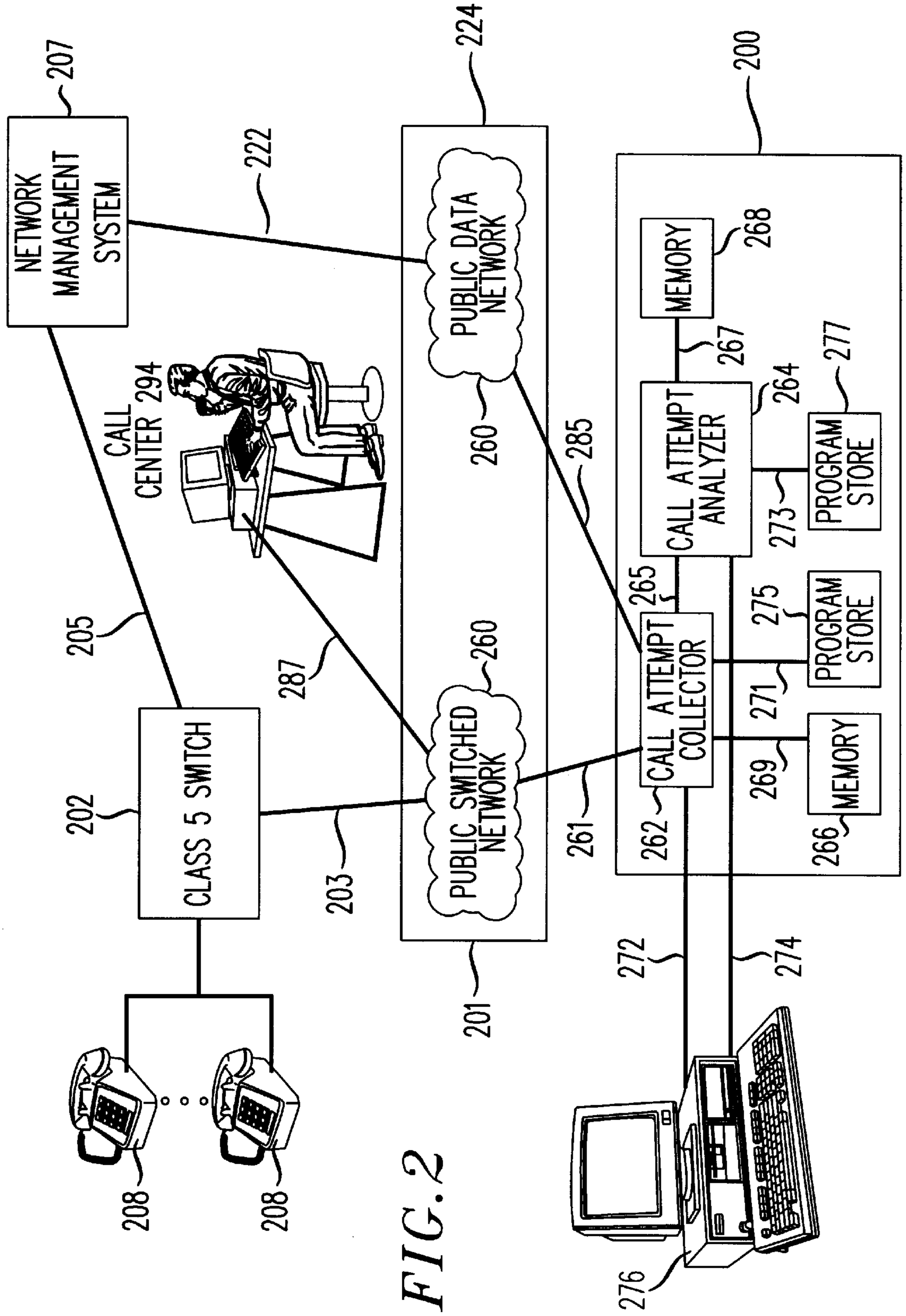
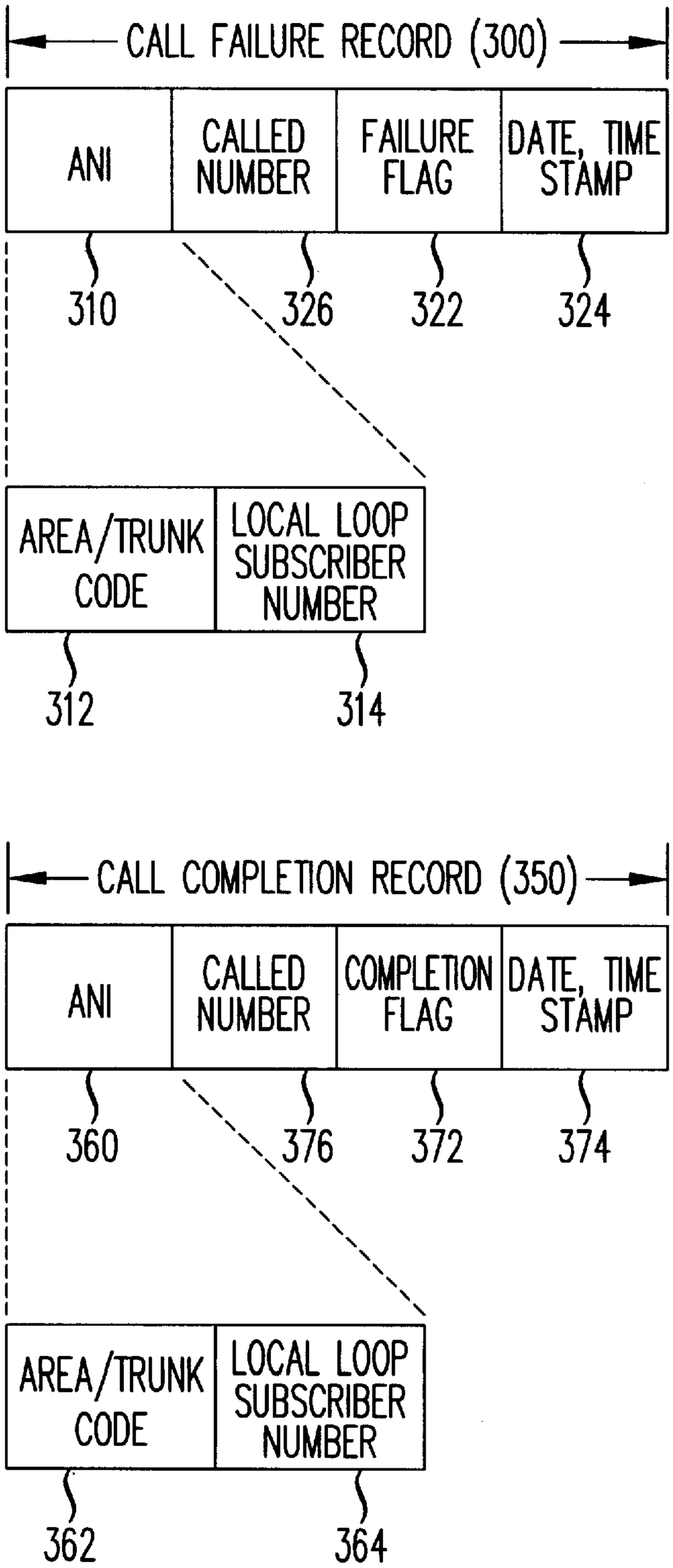

207
NETWORK MANAGEMENT SYSTEM
222
224
200
PUBLIC DATA NETWORK
CALL CENTER 294
260
285
MEMORY
268
267
CALL ATTEMPT ANALYZER
264
273
PROGRAM STORE
277
265
205
287
CALL ATTEMPT COLLECTOR
275
PROGRAM STORE
271
269
MEMORY
266
202
CLASS 5 SWITCH
203
PUBLIC SWITCHED NETWORK
260
261
262
272
274
201
208
208
276

FIG.2

FIG. 3
(PRIOR ART)



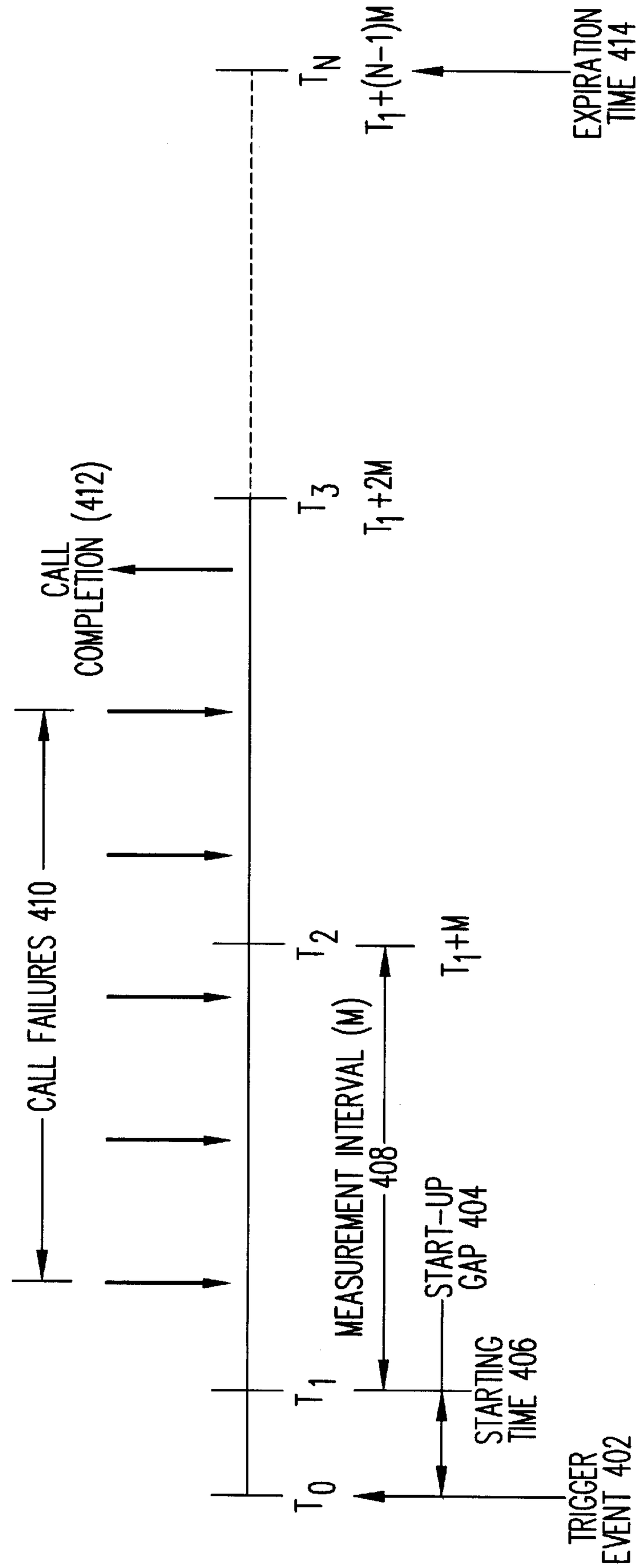

T_N
$T_1+(N-1)M$
EXPIRATION TIME 414
CALL COMPLETION (412)
T_3
T_1+2M
CALL FAILURES 410
T_2
MEASUREMENT INTERVAL (M)
408
T_1+M
START-UP GAP 404
T_1
STARTING TIME 406
T_0
TRIGGER EVENT 402

FIG. 4

FIG. 5

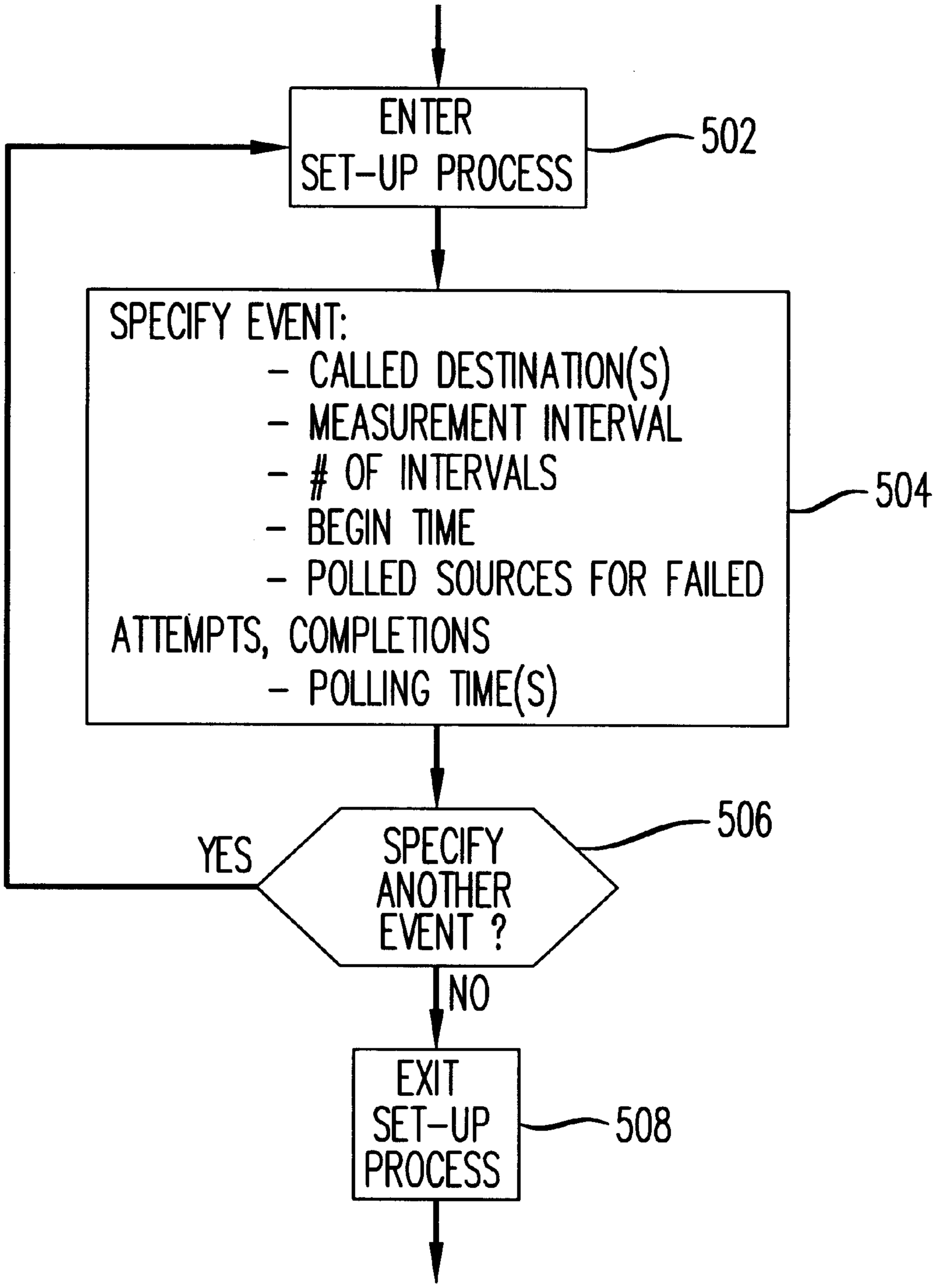

ENTER
SET-UP PROCESS
502
SPECIFY EVENT:
- CALLED DESTINATION(S)
- MEASUREMENT INTERVAL
- # OF INTERVALS
- BEGIN TIME
- POLLED SOURCES FOR FAILED
ATTEMPTS, COMPLETIONS
- POLLING TIME(S)
504
SPECIFY
ANOTHER
EVENT ?
506
YES
NO
EXIT
SET-UP
PROCESS
508

FIG. 6

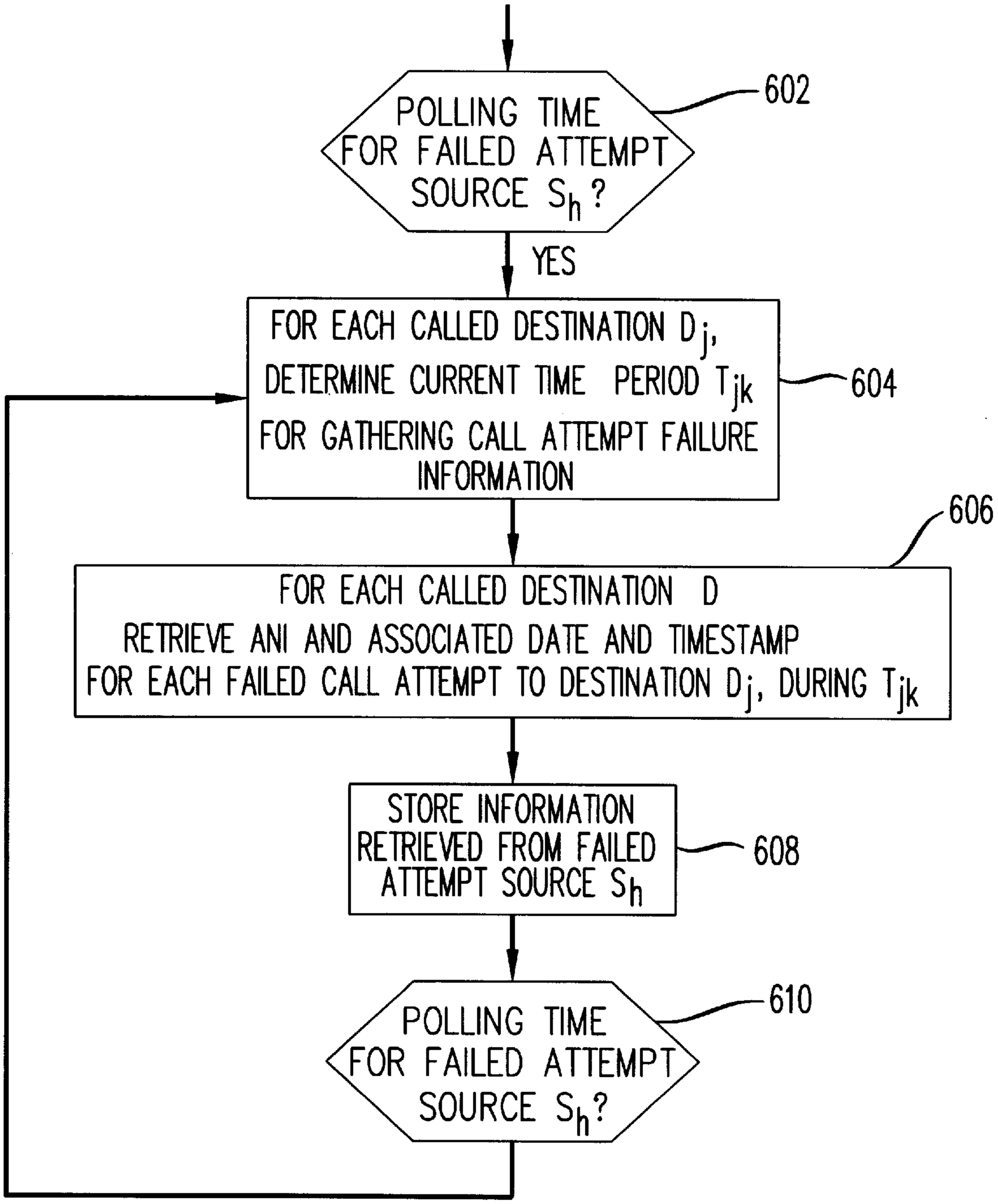

POLLING TIME FOR FAILED ATTEMPT SOURCE S_h ?
602
YES
FOR EACH CALLED DESTINATION D_j, DETERMINE CURRENT TIME PERIOD T_{jk} FOR GATHERING CALL ATTEMPT FAILURE INFORMATION
604
606
FOR EACH CALLED DESTINATION D RETRIEVE ANI AND ASSOCIATED DATE AND TIMESTAMP FOR EACH FAILED CALL ATTEMPT TO DESTINATION D_j, DURING T_{jk}
STORE INFORMATION RETRIEVED FROM FAILED ATTEMPT SOURCE S_h
608
POLLING TIME FOR FAILED ATTEMPT SOURCE S_h?
610

FIG. 7

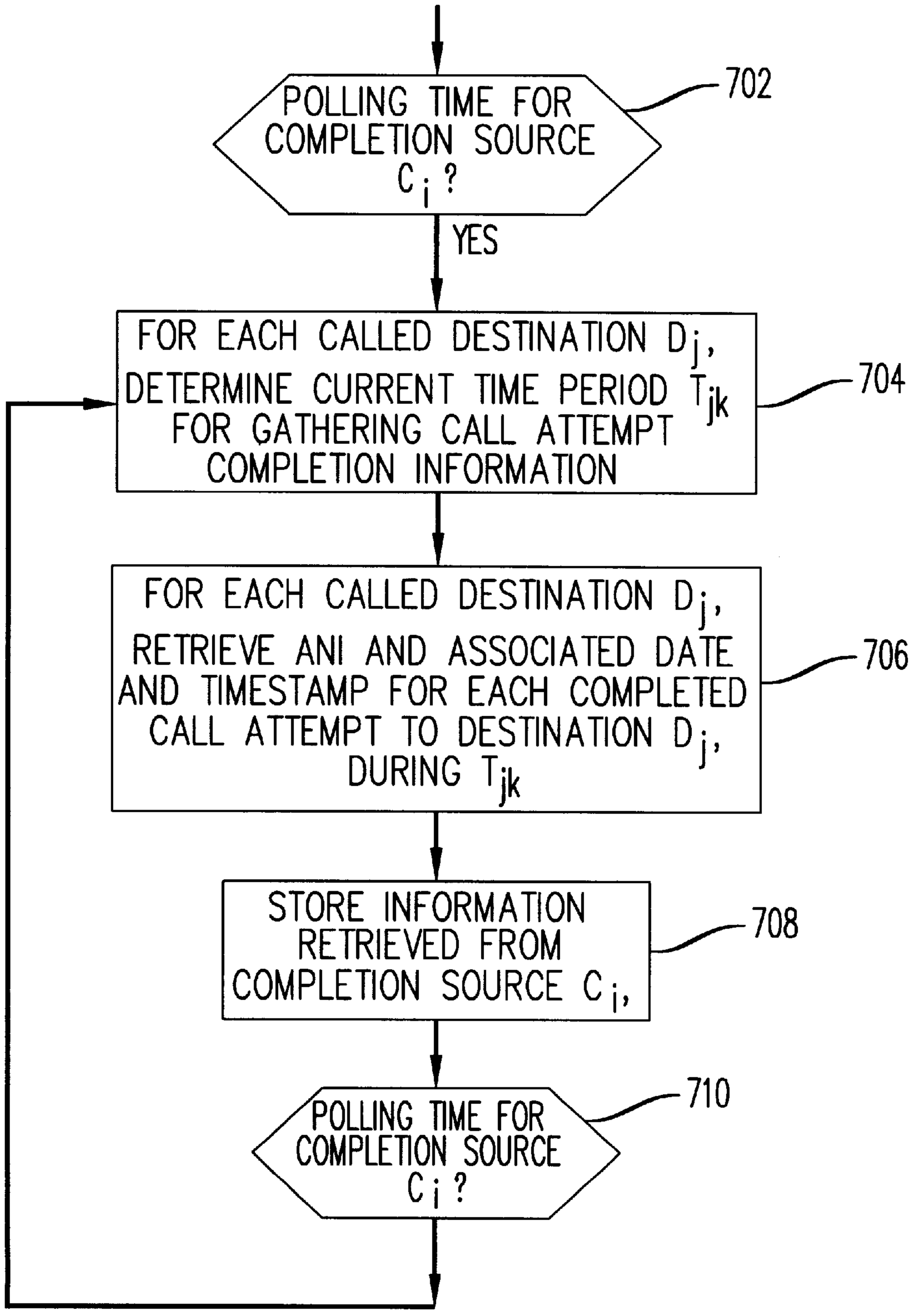
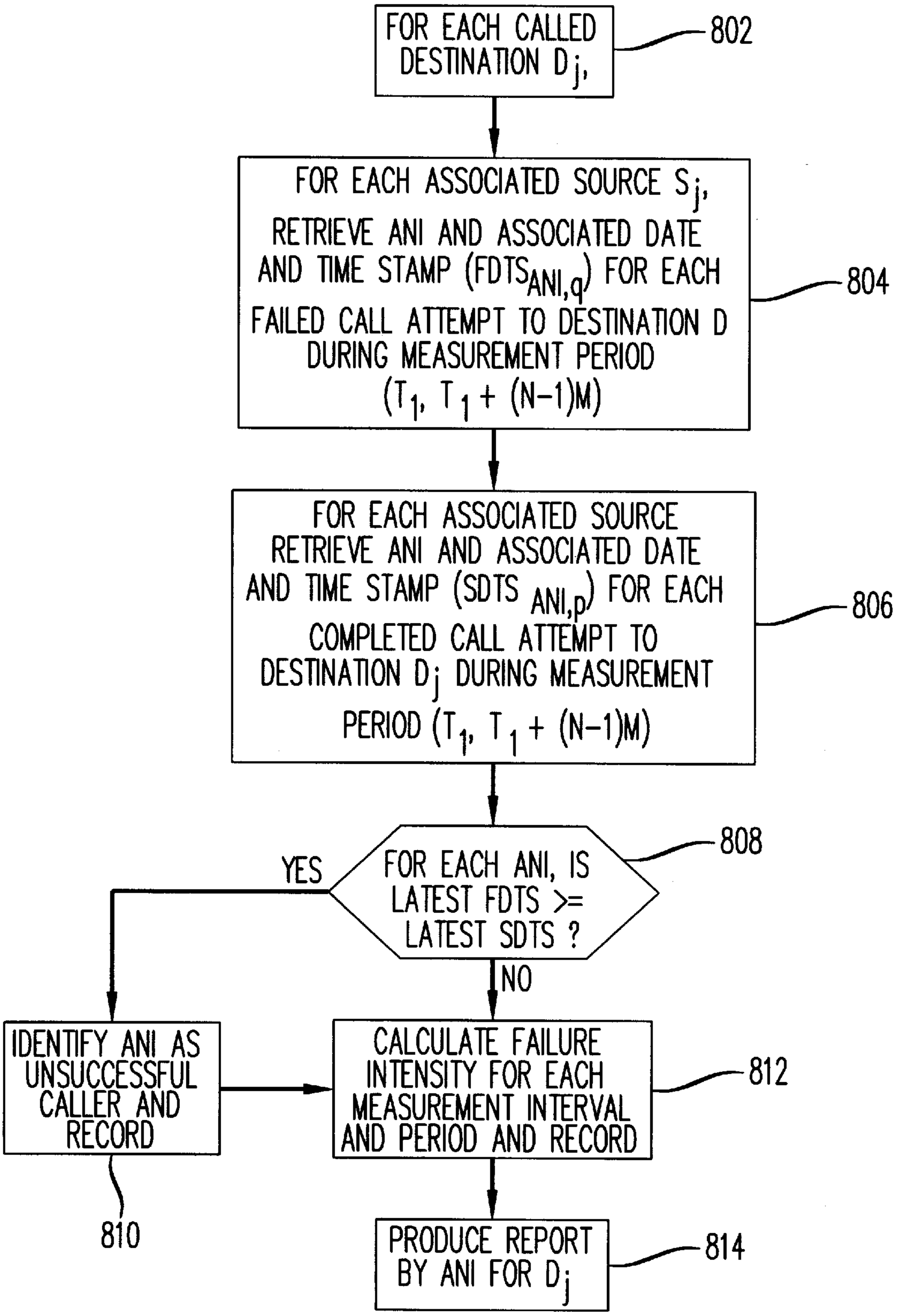

POLLING TIME FOR COMPLETION SOURCE C_i ?
702
YES
FOR EACH CALLED DESTINATION D_j, DETERMINE CURRENT TIME PERIOD T_{jk} FOR GATHERING CALL ATTEMPT COMPLETION INFORMATION
704
FOR EACH CALLED DESTINATION D_j, RETRIEVE ANI AND ASSOCIATED DATE AND TIMESTAMP FOR EACH COMPLETED CALL ATTEMPT TO DESTINATION D_j, DURING T_{jk}
706
STORE INFORMATION RETRIEVED FROM COMPLETION SOURCE C_i,
708
POLLING TIME FOR COMPLETION SOURCE C_i ?
710

FIG. 8


FOR EACH CALLED DESTINATION D_j,
802
FOR EACH ASSOCIATED SOURCE S_j, RETRIEVE ANI AND ASSOCIATED DATE AND TIME STAMP ($FDTS_{ANI,q}$) FOR EACH FAILED CALL ATTEMPT TO DESTINATION D DURING MEASUREMENT PERIOD (T_1, $T_1 + (N-1)M$)
804
FOR EACH ASSOCIATED SOURCE RETRIEVE ANI AND ASSOCIATED DATE AND TIME STAMP ($SDTS_{ANI,p}$) FOR EACH COMPLETED CALL ATTEMPT TO DESTINATION D_j DURING MEASUREMENT PERIOD (T_1, $T_1 + (N-1)M$)
806
FOR EACH ANI, IS LATEST FDTS >= LATEST SDTS ?
808
YES
NO
IDENTIFY ANI AS UNSUCCESSFUL CALLER AND RECORD
810
CALCULATE FAILURE INTENSITY FOR EACH MEASUREMENT INTERVAL AND PERIOD AND RECORD
812
PRODUCE REPORT BY ANI FOR D_j
814

METHOD AND APPARATUS FOR IDENTIFYING TELEPHONE CALLERS WHO HAVE BEEN UNSUCCESSFUL IN REACHING A CALLED DESTINATION

FIELD OF THE INVENTION

This invention relates to the network management of telephone systems, and more particularly to the identification and characterization of calling parties who have had at least one failed call attempt to a specified called party destination over a particular interval of time.

BACKGROUND OF THE INVENTION

In a large-scale public communications network, a calling party may not always be successful in connecting to a desired called party destination. Connection failures can be attributed to many causes, including the unavailability of the called party and the possibility of network blockages and other call-affecting network failures at many points across the network. The impact of these failed calls can be significant.

For example, direct marketers, in particular, generate substantial revenues from buyers who call in response to advertisements placed in wide-reaching media such as TV and radio, the Internet, and newspapers. The direct marketers often provide 800 numbers in their advertisements to encourage buyer response by telephone. Broadly placed direct marketing advertisements can generate high levels of potential buyer demand across a wide geographic area. This demand can result in high associated 800 service call volumes, which can exceed network capacities, and thereby lead to heightened incidences of network blockage and call failure. The resulting failed calls can represent a significant loss in potential buyers and in potential revenues for the direct marketers.

Some information about the call attempts made by these otherwise lost buyers is currently available. For example, caller identification data can be captured by a local exchange carrier (LEC), and forwarded to other LECs and interexchange carriers (IXCs) in the calling chain (see, e.g., U.S. Pat. No.5,530,741, issued to Rubin on Jun. 25, 1996). And network management systems supporting individual network operators are capable of tracking call attempt failures in association with caller identification data (see, e.g., 5ESS Input/Output Messages, Manual No. 235-600-700/750, Issue 15.01C, Lucent Technologies Inc., Mar. 1998, describing an MDII message used, among other things, to report call attempt failure information to local and centralized network maintenance consoles where 5ESS switch performance is monitored). However, while some of the required information components exist, no single, integrated mechanism has heretofore been developed to collect failed call attempt information in a reliable, integrated fashion from the multiple exchange carriers that collectively provide, for example, 800 service to prospective buyers in a direct marketing environment.

SUMMARY OF THE INVENTION

Called party access to information about failed call attempts is significantly enhanced in an unsuccessful caller identification system that uses standard caller identification

information as a basis for comparing call attempt data retrieved from a variety of sources. Specifically, call failure records routinely tracked by the IXCs and LECs (using systems such as Lucent Technologies' NETMINDER with network trouble patterning features) are compared with call completion data (tracked by sophisticated call center systems such as Lucent Technologies' DEFINITY Enterprise Communications Server—Automatic Call Distributor Platform).

In an exemplary embodiment of the invention, the unsuccessful caller identification system comprises a call attempt collector and a call attempt analyzer that are interconnected to telecommunications network facilities for one or more IXC's and LEC's. The system further comprises a method by which the call attempt collector and the call attempt analyzer, respectively, retrieve call attempt data via the network and examine the retrieved information to identify calling parties who were unsuccessful in reaching one or more specified called destinations. The system provides a way for users to specify its parameters of operation, and a way for users to retrieve and display the results of its analyses.

BRIEF DESCRIPTION OF THE DRAWING

A more complete understanding of the invention may be obtained by reading the following detailed description of a specific illustrative embodiment of the invention in conjunction with the appended drawing in which:

FIG. **1** illustrates a conventional telephone network providing 800 service, and indicates the possible call blockage points in a typical 800 call attempt;

FIG. **2** depicts an illustrative embodiment of the present invention;

FIG. **3** provides a high-level description of the data records that are collected and analyzed by the present invention in its normal operation;

FIG. **4** shows a timeline for this data analysis;

FIG. **5** diagrams the process by which data gathering and analysis are initiated;

FIG. **6** diagrams the process by which failed call attempt data are gathered from each LEC and IXC source;

FIG. **7** diagrams the process by which call attempt completion data are gathered from each call center or other source; and

FIG. **8** illustrates the associated analysis and reporting process.

For consistency and ease of understanding, those elements of each figure that are similar or identical share reference numerals that are equivalent in the two least significant digit positions (for example, call center **194** of FIG. **1** is equivalent to call center **294** of FIG. **2**).

DETAILED DESCRIPTION

By way of further background, in a typical 800 service telephone call made, for example, by a prospective purchaser to a direct marketer's call center, numerous opportunities exist for network blockage and call attempt failures. A simplified illustration depicting a conventional 800 service telephone network is shown in FIG. **1**. In FIG. **1**, the

network comprises two local exchange networks **100**, **180** (hereinafter referred to as LECN's) and an interexchange network **140** (hereinafter referred to as an IXCN). The LECN **100** includes two standard, so-called class **5** switches **102**, **106** and a signal transfer point/network control point cluster **112** (hereinafter referred to as an NCP). Each cluster, incorporating its own network topology to interconnect network control point nodes to network switches via signal transfer point nodes, is shown in a simplified fashion for illustrative purposes as a singular node in the network. Similar to the LECN **100**, the LECN **180** of FIG. **1** includes two class five switches **186**, **190** and an NCP **182**. The IXCN **140** contains two interexchange switches **142**, **148** and an NCP **146**.

The NCP's **112**, **146** and **182** provide routing information that assists in establishing the network path required to complete an 800 service call. Thus, as illustrated by this example, when a subscriber **108** places an 800 service call, the subscriber's connecting class **5** switch **102** queries its associated NCP **112** to determine routing through the LECN **100**. In this example, the switch **102** routes the call through the switch **106** to reach the IXCN **140**.

At the IXCN **140**, the interexchange switch **142** queries its NCP **146** to determine routing through IXCN **140**. In this case, the switch **142** routes the call through the interexchange switch **148** to reach the LECN **180**. At the LECN **180**, the class **5** switch **186** queries its associated NCP **182** to determine that the call should be routed through the switch **190** to finally reach the called party at the call center **194**.

As can be seen from this simplified example depicted in FIG. **1**, a typical 800 service call is directed on a path through a number of switch nodes in several networks in order to reach its final destination. Blockages and other conditions leading to call attempt failures can occur at many points on this path. For example, a blockage **110** may prevent the subscriber **108** from reaching the switch **102**. Blockages **104**, **130**, **150**, **170**, and **188** may occur along the switched path between the switch **102** serving the subscriber **108** and the switch **190** serving the call center **194**. Blockages **114**, **144**, and **184** may occur between the switches **102**, **142**, and **186**, and the NCP's **112**, **146**, and **182**, respectively. And a blockage **192** may occur between the call center **194** and the switch **190**. These examples are merely illustrative, and do not account for call attempt failures caused by many other possible failure conditions experienced at the switches and within the NCP clusters.

Because call attempt failures prevent calling parties from directly reaching called parties, these called parties will typically be unaware of call attempt failures. Even under circumstances in which a called party is supported by a call center with access to call failure data provided by a supporting LECN, the called party will remain unaware of call failures occurring outside of the boundaries of that LECN. Unaware, the called parties will be unable to actively remedy call failures occurring outside of these boundaries.

In accordance with the invention, called party access to information about failed call attempts is significantly enhanced by an unsuccessful caller identification system that uses standard caller identification information as a basis for comparing call attempt data retrieved from a variety of sources.

A specific illustrative embodiment of this system is depicted in FIG. **2**. Unsuccessful caller identification system **200** comprises a call attempt collector **262** with an associated memory **266** and a program store **275**. The system **200** further comprises a call attempt analyzer **264** with an associated memory **268** and a program store **277**.

Information is provided to the system **200** via a series of communications networks **201** and associated links. For example, access by the system **200** to a public switched network **260** in network **201** is provided via a link **261**. In addition, the system **200** has access to a public data network **224** in network **201** via a link **285**.

User access to the system **200** is provided via a terminal **276** or another peripheral device. In the embodiment of FIG. **2**, the terminal **276** is connected to the call attempt collector **262** and the call attempt analyzer **264** by the links **274**, **272** respectively.

Key to its operation, the system **200** incorporates software that is stored in the program stores **275**, **277**. The programmed system may be implemented within a network management system maintained by an LEC or IXC, within a call center system, or as a stand-alone, general purpose computer system with stored program control and telephonic data communications capabilities.

An interested called party (hereinafter referred to as the called party user) controls actions taken by the system **200** of FIG. **2** to collect and analyze failed call attempt data. A called party user request for tracking call attempts is entered via the terminal **276** to the call attempt collector **262** and to the call attempt analyzer **264** via links **274**, **272**, respectively. Details of the request associated with data gathering are stored by the call attempt collector **262** in the memory **266**, and details associated with the analysis of the data are stored by the call attempt analyzer **264** in the memory **268**.

Over a time period specified in the called party user request, the system **200** of FIG. **2** accesses the public switched network **260** via the link **261** and the public data network **224** via the link **285** to retrieve and process the requested data. The data are retrieved from LEC and IXC facilities such as the LEC network management system **207** and call center facilities such as the call center **294**.

More specifically, call attempt data for each called party are retrieved from user-specified data sources by the call attempt collector **262**, and sent over the link **269** to be stored in the memory **266**. The call attempt analyzer **264** retrieves this data via the call attempt collector **262** for analysis. After this data is analyzed, the results of the analysis are sent by the call attempt analyzer **264** over the link **267** to be stored in the memory **268**. The called party user is able to view the results of the analysis at the terminal **276** by asking the call attempt analyzer **264** to retrieve these results from the memory **268**.

The call attempt collector **262** gathers data provided in the formats illustrated in FIG. **3**. Network management systems supporting LEC and IXC networks provide failed call attempt data in a standard call failure record (hereinafter referred to as a CFR) format **300** (see, e.g., International Telecommunication Union—Telecommunication Standardization Sector (ITU-T) Standard Q.825—Call Detail Recording, incorporated herein by reference). The CFR

format **300** includes an area or trunk code field **312** and a local loop subscriber number field **314**. These two elements together represent an automatic number identification field **310** (hereinafter referred to as an ANI field), which identifies the calling party. Additionally, the CFR format **300** includes a field **326** containing a representation of the called number, a failure flag field **322** and a date and time stamp field **324**.

Call completion data are provided in a standard call completion record (hereinafter referred to as a CCR) format **350** of FIG. **3**. These data are supplied by the same LEC and IXC network management systems that supply failed call attempt data, or by one or more call centers supporting the called party. Accordingly, the individual sources of data (hereinafter denoted as the data sources S_h) for failed call attempts may be somewhat different from the individual sources of data (hereinafter referred to as the data sources C_i) for completed calls (successful call attempts).

The manner in which call completion data can be provided by a call center is well established. For example, call completions may be logged by a Definity®) Enterprise Communications Server—ACD Platform, and retrieved using an ASAI protocol over a CTI port by a call center management system such as Nabnassett's Voice Enhanced Services Platform.

Similar to the CFR format **300**, the CCR format **350** of FIG. **3** includes an ANI field **360** comprising an area or trunk code **362** and a local loop subscriber number **364**. Further, the format **350** includes a field **376** containing a representation of the called number, a completion flag field **372** and a date and time stamp field **374**.

The timing of collection activities by the call attempt collector **262** of FIG. **2** is illustrated in FIG. **4**. Collection activities are typically initiated by a trigger event **402**, which may be, for example, associated with a call-stimulating direct marketing event such as an Internet-announced sales offer. If the called party user anticipates a delay in caller response to this stimulus, data collection may be delayed as indicated by start-up gap **404** to begin at a starting time **406**.

Call attempt data is collected from the starting time **406** through an expiration time **414**. Expiration time **414** is defined as:

$$T_1+(N-1)*M \tag{1}$$

where:

T_1 is the starting time **406**,

M is a user-defined measurement interval, and

N is a user-specified integer, such that

(N−1)*M defines the total measurement period

Over the period delimited by the starting time **406** and the expiration time **414**, data are collected by the call attempt collector **262** of FIG. **2**. These collected data are illustrated as the call failures **410** and the call completions **412** shown in FIG. **4**. The data are analyzed by the call attempt analyzer **264** of FIG. **2** to provide several types of information for the called party user.

First, data for each unique ANI are processed by the analyzer unit **264** to determine whether the associated calling party who experienced a failed call attempt either made no subsequent attempt or failed to reach the called party on a subsequent attempt. Such callers are hereinafter referred to as unsuccessful callers. Information about unsuccessful callers can be important, for example, in assisting direct marketers to identify calling parties who may be good targets for a variety of forms of follow-up contact, including , for example, a targeted directed mail promotion.

Secondly, data for each ANI are processed by the analyzer unit **264** to determine the number of times in a given time period that the associated calling party attempted to reach the called party destination (hereinafter referred to as the call attempt intensity). It is well-accepted within the direct marketing community that a significant relationship exists between call attempt intensity and propensity to purchase. Accordingly, the call attempt analyzer **264** can, for example, compute purchase propensity for each ANI as a function of call attempt intensity as follows:

$$\text{Propensity}_{ANI,M,i,CS=0}=\Sigma(\text{call failures}) \tag{2}$$

and

$$\text{Propensity}_{ANI,M,i,CS>0}=0$$

for each interval i of length M in the measurement period spanning from T_1 through $T_1+(N-1)*M$,

where

CS represents the number of successful call attempts associated with the ANI during interval i.

Once the purchase propensities are calculated, the ANI's may be rank ordered by purchase propensity, and an index may be established, for example, relative to an average or otherwise normalized value Propensity_{AVG}:

$$\text{Propensity Index}_{ANI}=(\text{Propensity}_{ANI})/(\text{Propensity}_{AvG}) \tag{3}$$

Because each ANI field **310** of FIG. **3** contains an area code **312**, the call attempt analyzer **264** of FIG. **2** can also analyze purchase propensity data by area code to uncover geographic regions that exhibit high purchase propensities. Finally, because direct marketers can associate different promotional campaigns or media with distinct called party destinations (for example, by creating an Internet promotion with one 800 service response number and a radio promotion with another distinct 800 service response number), the effectiveness of each campaign and each medium can also be evaluated in terms of call volumes and purchase propensities.

The processes used to operate the unsuccessful caller identification system **200** of FIG. **2** are illustrated in FIGS. **5** through **8**.

In FIG. **5**, a process is outlined that enables called party users to set up the system **200** for operation. Users enter the set-up process in step **502** of FIG. **5**. This entry step is generally accomplished by issuing one or more commands to the system **200** from the terminal **276** of FIG. **2**. After entering the process, the user is prompted in step **504** to supply a series of information that specifies what actions the system **200** will perform on the user's behalf. These actions are hereinafter referred to as the monitoring event. The information supplied by the user includes one or more called party destinations to be monitored, the measurement interval M, the number of intervals N−1 to be monitored, the data sources (for example, LEC and IXC network management systems, and call center systems) to be polled, and the times

at which the data sources should be polled. The called party destinations may be supplied using a destination number identifier (DNI) field similar to the ANI field defined above and illustrated as field **326** in FIG. **3**. The ability to monitor multiple DNIs will be particularly useful under circumstances in which a single called party employs multiple DNIs (for example, when the called party is served by an automatic call distribution system such as Lucent Technologies'DEFINITY Enterprise Communications Server—Automatic Call Distributor Platform).

After responding to these prompts, the user is asked in step **506** of FIG. **5** whether he or she wishes to specify another monitoring event. If the user responds affirmatively, he or she is brought back to the entry step **502**. Otherwise, the user exits the process in step **508**.

Once the monitoring event has been specified, the call attempt data collection processes illustrated in FIGS. **6**, **7** can begin. FIG. **6** illustrates the call attempt failure data acquisition process. In step **602**, for each failed call attempt data source S_h, the call attempt collector **262** of FIG. **2** decides based on user set-up data whether a time has been reached for polling the data source. If such a time has been reached, the call attempt collector **262** of FIG. **2** determines in step **604** of FIG. **6** which of the called party destinations D_j are expecting call attempt data for the current time period T_{jk}. For each such destination D_j, the call attempt collector **262** of FIG. **2** retrieves the ANI and a date and time stamp for each failed call attempt recorded by source S_h during the current time period T_{jk}(see step **606** of FIG. **6**). In step **608**, the call attempt collector **262** of FIG. **2** stores the retrieved information in the memory **266**, and in step **610**, the call attempt collector **262** waits for the next polling time for source S_h to be reached.

A similar process for capturing successful call attempt data is illustrated in FIG. **7**. In step **702**, the call attempt collector **262** of FIG. **2** waits until a polling time has been reached for successful call attempt source C_i. In step **704** of FIG. **7**, the collector **262** determines which of the destinations D_j are expecting call attempt data for a current time period T_{jk}. In step **706**, the call attempt collector **262** of FIG. **2** retrieves the ANI and a date and time stamp for each successful call attempt made during the current time period T_{jk} to each destination D_j. In step **708** of FIG. **7**, the call attempt collector **262** of FIG. **2** stores the information retrieved in step **706**, and in step **710**, waits for the next polling time for source C_i.

Once the necessary call attempt data have been collected, the call attempt analyzer **264** of FIG. **2** carries out the analysis and reporting process, as illustrated in FIG. **8**. The process is undertaken for each called party destination D_j as indicated in step **802**. In step **804**, the ANI for each calling party and an associated date and time stamp are retrieved for each failed call attempt record in which the date and time stamp for that record falls within the user-specified measurement period from T_1 to $T_1+(N-1)*M$. In step **806** of FIG. **8**, the ANI for each calling party and associated date and time stamp are similarly retrieved from each completed call attempt record in which the date and time stamp fall within the measurement period.

In step **808** of FIG. **8**, for each calling party, the call attempt analyzer **264** of FIG. **2** examines the latest date and time stamps for each call failure record and call completion record, to determine which date and time stamp is later in time. If the date and time stamp for the failed call attempt is later in time than the date and time stamp for the call completion, the call attempt analyzer **264** of FIG. **2** identifies the calling party as unsuccessful in step **810** of FIG. **8**. In step **812**, call attempt failure intensities are calculated for each calling party.

Finally, in step **814** of FIG. **8**, a report is prepared and stored in the memory **268** of FIG. **2** for subsequent retrieval by the called party user for each called party destination D_j. For each called party destination D_j, for example, the report identifies each calling party (by ANI) that experienced at least one failed call attempt, indicates which calling parties were unsuccessful as determined in step **808** of FIG. **8**, and provides one or more measures of call attempt intensity for each identified calling party over the measurement period.

The exemplary embodiment of this method described above is but one of a number of alternative embodiments of the invention that will be apparent to those skilled in the art in view of the foregoing description. Accordingly, this description is to be construed as illustrative only, and is for the purpose of teaching those skilled in the art the best mode of carrying out the invention. Various other alternatives can be devised by a worker skilled in the art without departing from the teachings of this invention. For example, the memories **266**, **268** of FIG. **2** could be combined into a single memory element, and the determination of whether a calling party had been unsuccessful as diagrammed in FIG. **8** could be broadened to include calling parties whose call completions occurred at a time later than a specified time period following their first failed call attempts.

We claim:

1. A system for identifying one or more calling parties who were unsuccessful in reaching a called destination, the system comprising:

a collector for collecting information about call attempts and call completions by each calling party to the called destination, wherein said collector collects call attempt information from a first network management system responsive to a local exchange carrier terminating said calling parties, collects call attempt and call completion information from a second network management system responsive to a local exchange carrier terminating said called destination and collects call attempt information from a third network management system responsive to an interexchange carrier network interconnecting said local exchange carriers; and

an analyzer for comparing the call attempt information with the call completion information to determine whether any of the one or more calling parties experienced at least one call attempt failure without also experiencing a subsequent call completion to the called destination.

2. The system of claim **1**, wherein said collector further collects call completion data from a call center in the local exchange network terminating said called destination.

3. The system of claim **1**, wherein the call attempt and call completion information includes an identifier for each calling party and a chronological stamp.

4. The system of claim **3**, wherein said identifier is an automatic number identifier (ANI) and said chronological stamp is a time and date stamp.

5. The system of claim 1, wherein said analyzer further determines an intensity of call attempts by each calling party over a specified period of time.

6. The system of claim 1, said system further comprising a first storage device for storing information retrieved by said collector, and a second storage device for storing information produced by said analyzer.

7. The system of claim 6, said system further comprising a user interface for receiving user requests, transmitting user requests to said collector and said analyzer, selectively retrieving information produced and stored by said collector and said analyzer in response to the user requests, and displaying the retrieved information.

8. The system as defined in claim 1, wherein the called party has a plurality of associated destination number identifiers (DNIs) the collector collects call attempt and call completion information for each of the plurality of DNIs, and the analyzer identifies any calling party having at least one call attempt failure associated with any of the plurality of DNIs that was not matched by a subsequent call completion to one of the plurality of DNIs.

9. A method for identifying a calling party whose call attempt to a called destination is unsuccessful, wherein the calling party is terminated by an originating network interconnected to an interexchange network and the called destination is terminated bv a destination network also interconnected to the interexchange network, the method comprising the steps of:

collecting call attempt data independently from a first network management system supporting the originating network, a second network management system supporting the interexchange network and a third network management system supporting the destination network;

collecting call completion data from the third network management system supporting the destination network;

storing the call attempt data and the call completion data; and

comparing the call attempt data and the call completion data according to pre-determined criteria.

10. The method of claim 9, wherein said call attempt and call completion data includes an identifier for said calling party and a chronological stamp.

11. The method of claim 9, wherein said collector collects call completion data from a call center terminated in the local exchange network terminating said called destination.

12. The method of claim 9, wherein said pre-determined criteria specify identifying each calling party experiencing at least one call attempt failure without also experiencing a subsequent call completion to the called destination within a first pre-determined time period.

13. The method of claim 9, wherein said pre-determined criteria specify identifying an intensity of call attempts by the calling party over a second pre-determined time period.

14. The method of claim 9, wherein said pre-determined criteria are established by a party associated with the called destination.

15. The method of claim 9, wherein the called party has a plurality of associated destination number identifiers (DNIs) the collector collects call attempt and call completion information for each of the plurality of DNIs, and the analyzer identifies any calling party having at least one call attempt failure associated with any of the plurality of DNIs that was not matched by a subsequent call completion to one of the plurality of DNIs.

* * * * *