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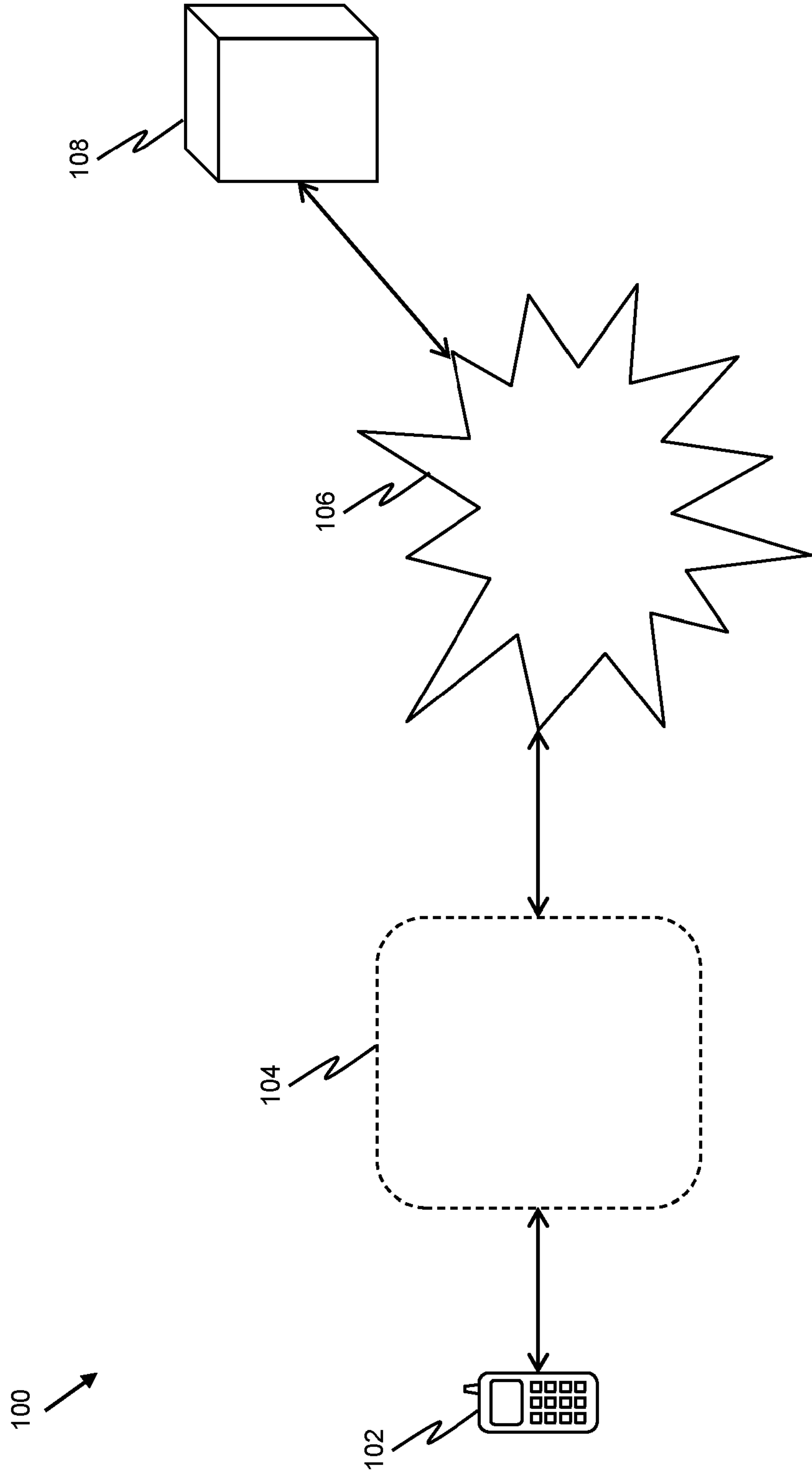
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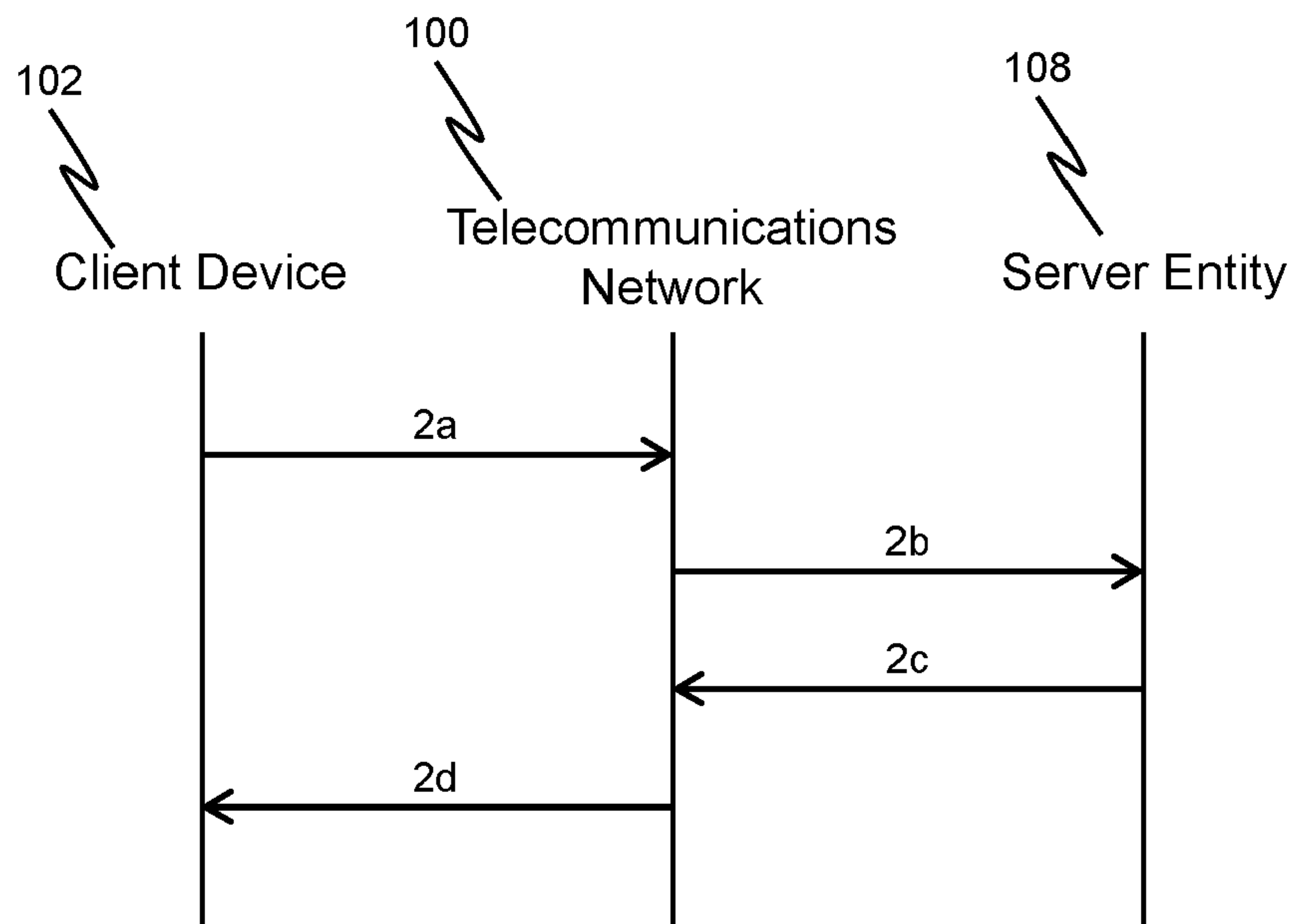
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Other: **NONE**

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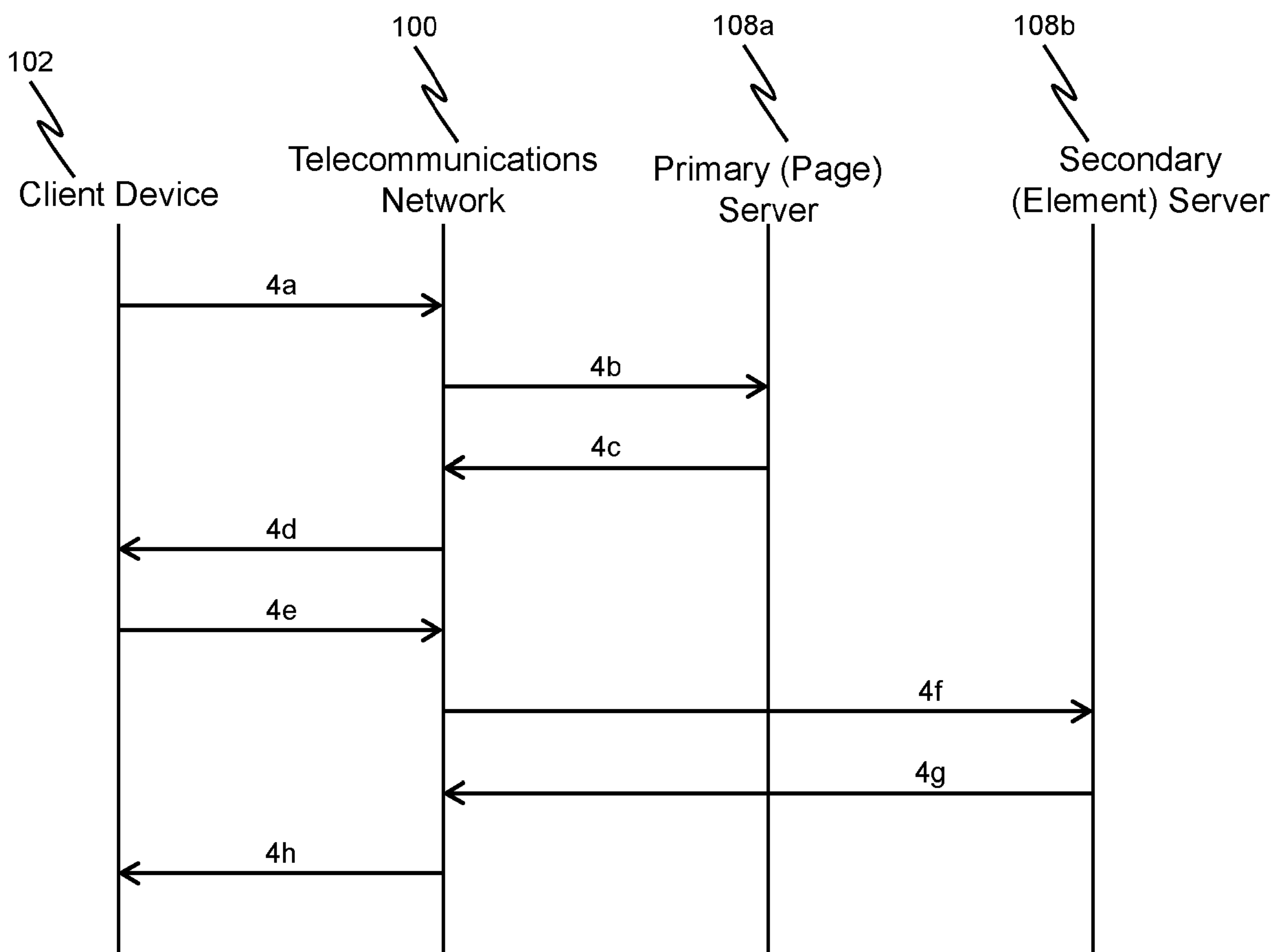
PRIOR ART

Figure 1



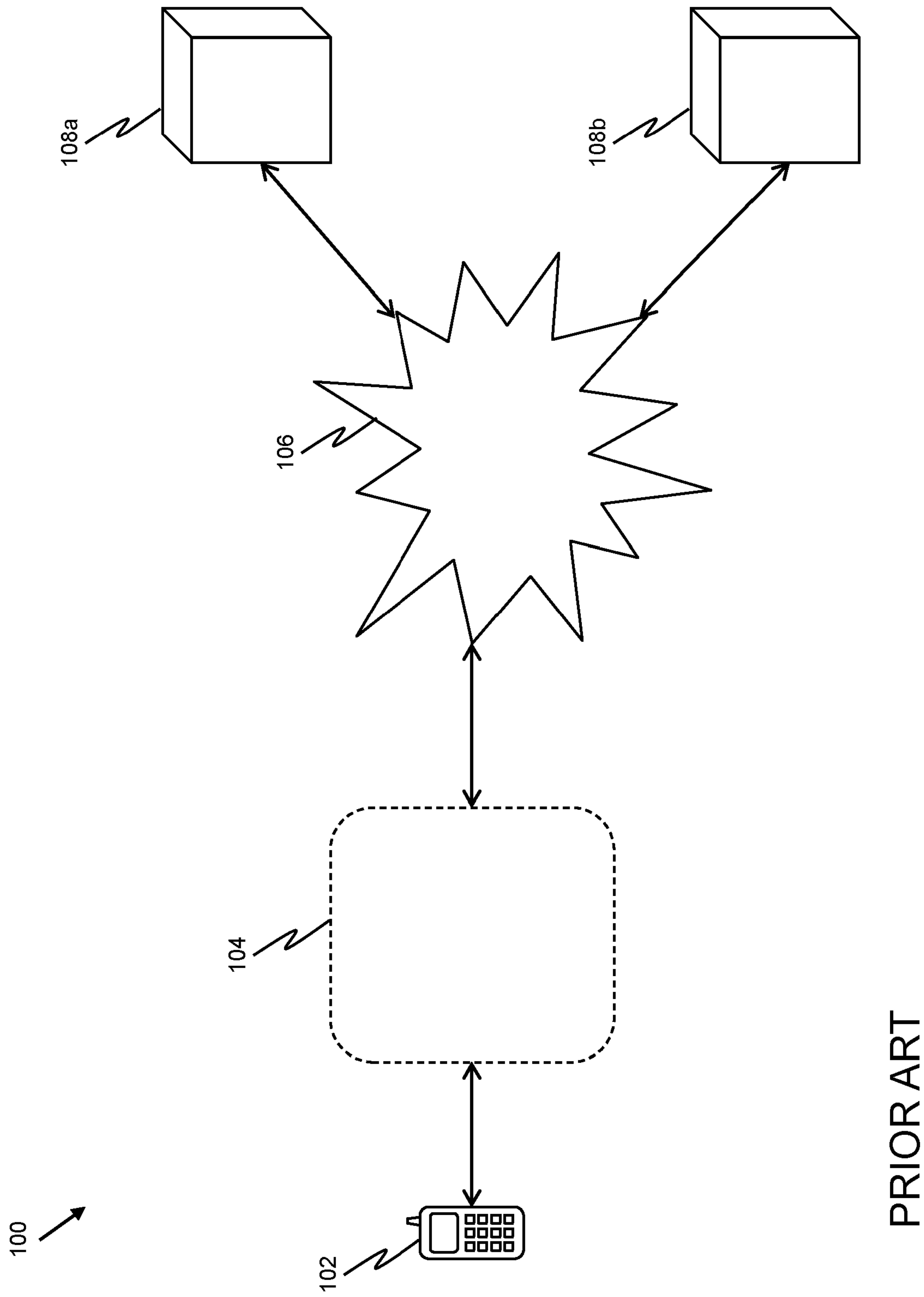
PRIOR ART

Figure 2



PRIOR ART

Figure 4



PRIOR ART

Figure 3

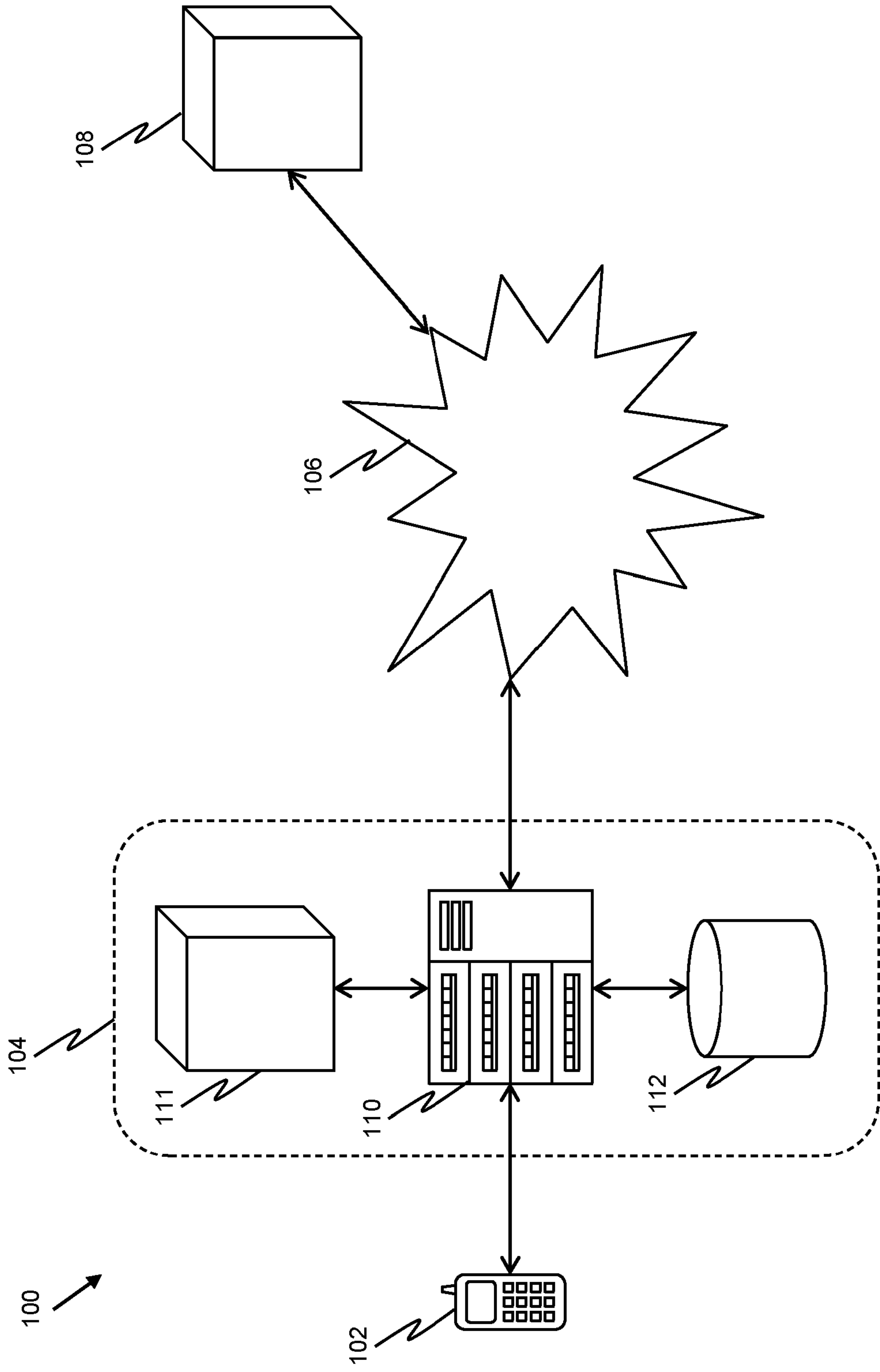


Figure 5

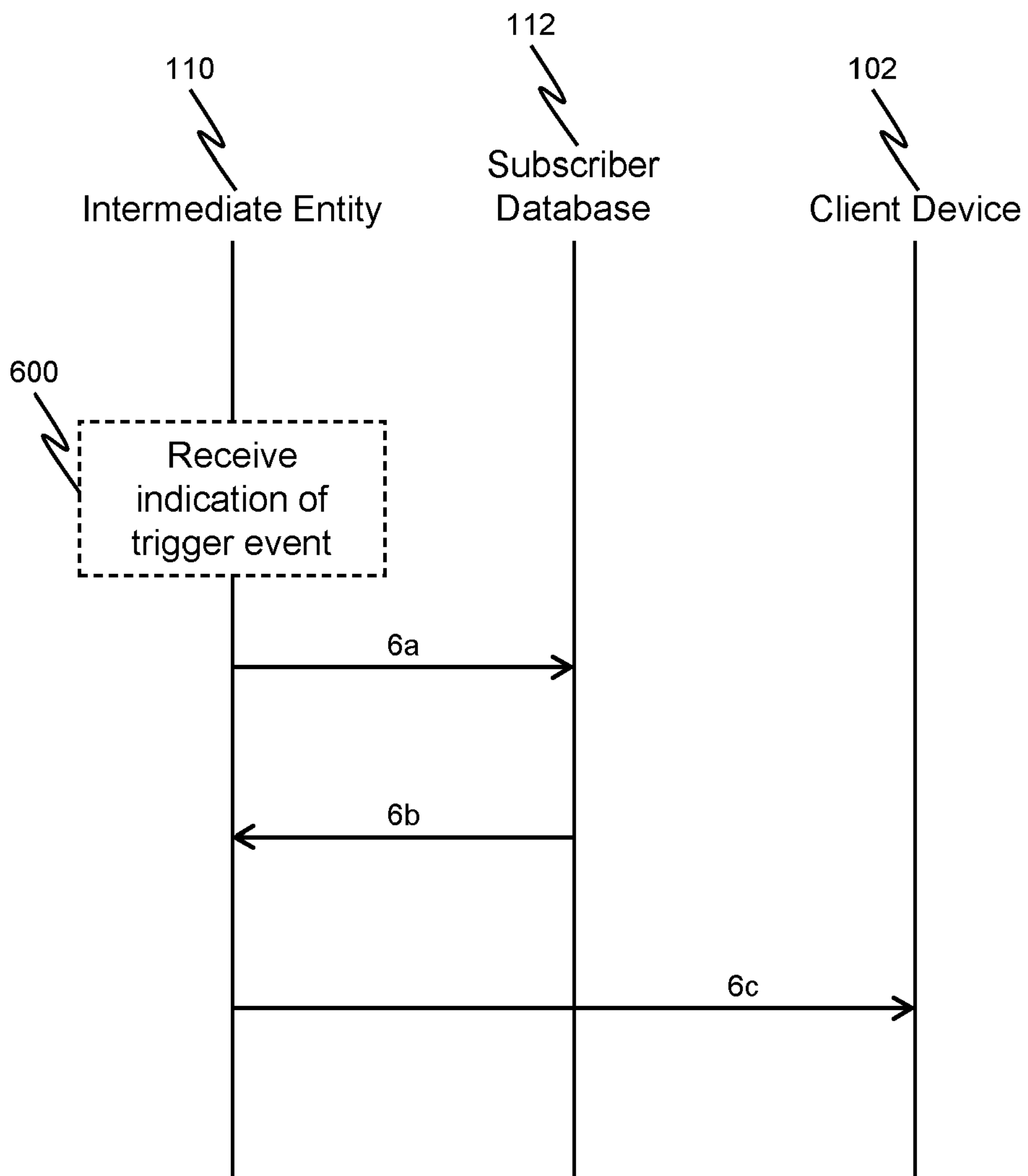


Figure 6

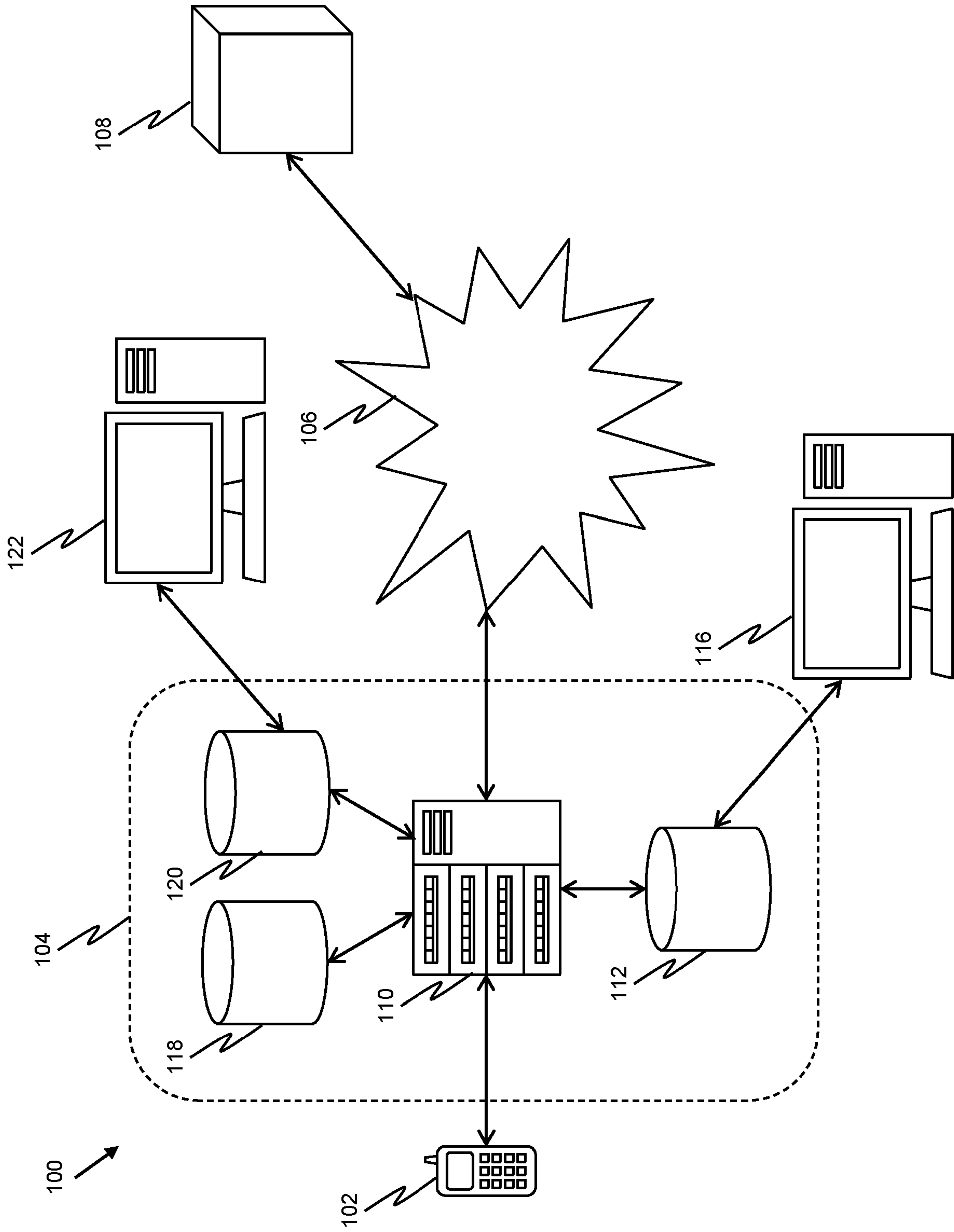


Figure 7

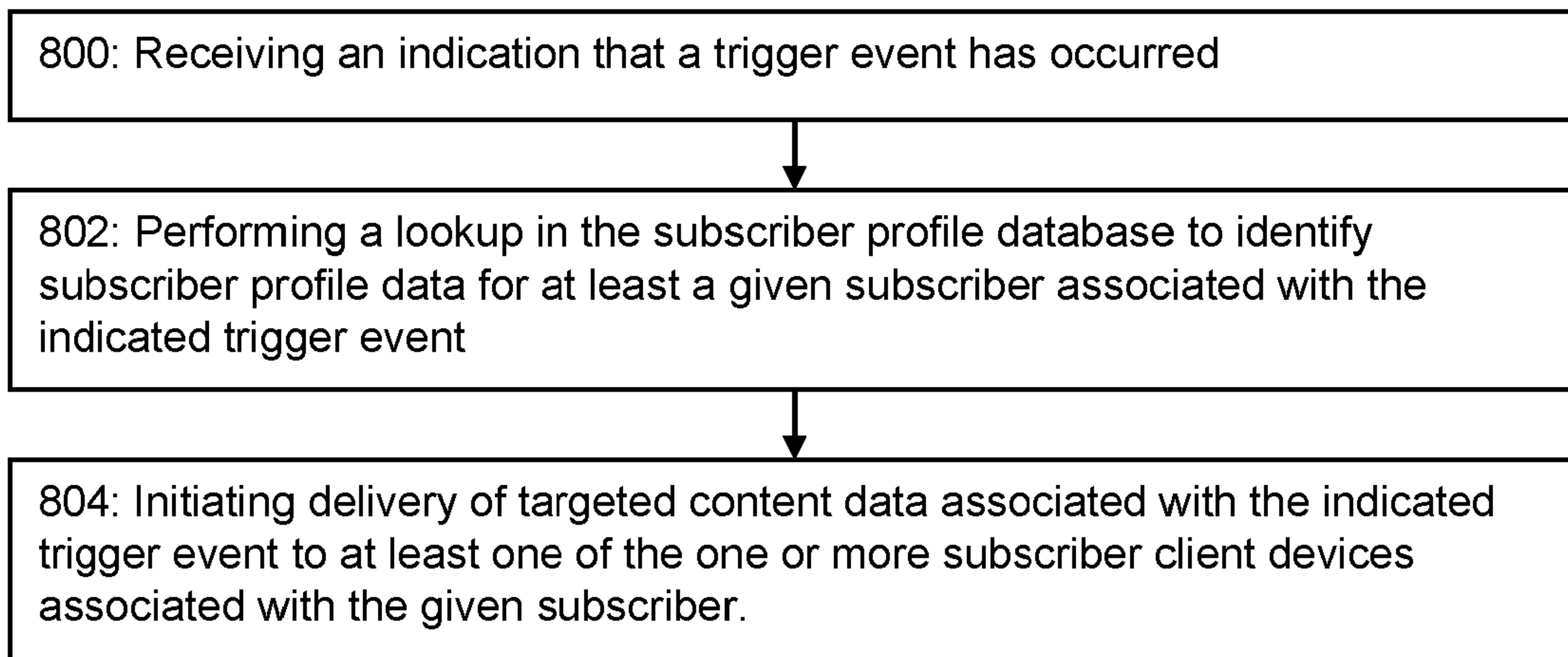


Figure 8



## Network Communications

### Technical Field

The present invention relates to network communications. In particular, but  
5 not exclusively, the present invention relates to the provision of targeted content data  
in a telecommunications network.

### Background

10 Accessing data stored at a remote location is typically performed via a  
telecommunications network, such as the internet. In order to transmit and receive  
data via a telecommunications network, users conventionally subscribe to a  
telecommunications service provided by a telecommunications service provider. A  
telecommunications service typically provides access to a telecommunications  
15 network for a given subscriber client device, or a group of subscriber client devices  
associated with a given subscriber. The service provider network typically performs  
subscriber authentication and comprises a routing fabric for routing traffic between an  
authenticated subscriber and the wider telecommunications network. A service  
provider may comprise a carrier, a mobile network operator (MNO) or an internet  
20 service provider (ISP). Subscriber client devices may include personal computers,  
laptop computers, mobile telephones (including “smart phones”), tablet computers,  
personal digital assistants, etc.

Figure 1 shows an example of a conventional telecommunications network  
100. A subscriber client device 102 may initially access a service provider network  
part 104 of the telecommunications network 100, which contains various entities  
25 provisioned by the service provider (not shown). Such service provider entities may  
be responsible for authentication of subscribers / subscriber client devices, access  
management, billing, etc. The service provider network 104 also typically acts as a  
gateway between subscriber client device 102 and a wider network 106, such as the  
public internet. The wider network 106 is, at least in part, used to route data between  
30 service provider network 104 and one or more server entities 108.  
Telecommunications network 100 may also comprise a number of further network  
parts (not shown), and a number of border/gateway/caching entities (not shown) used



to translate between the various network protocols used in each network part where necessary, cache and serve commonly accessed data so as to reduce load between network parts, and/or manage access to each network part.

Access to data via telecommunications network 100 is typically enabled using browser software or other applications (hereinafter “a browser”) on subscriber client device 102. Other applications on subscriber client device 102 may include games or software utilities that also require access to content via telecommunications network 100. For example, some applications accrue revenue by displaying advertisement content to their users. Such advertisement content is typically regularly updated and hosted at a server entity in telecommunications network 100. The application may therefore require access to the server entity via telecommunications network 100 in order to obtain up-to-date advertisement content to display to its users.

A browser enables subscriber client device 102 to take part in a browser session, which comprises a series of one or more requests and responses made to and received from one or more remote entities, such as server entity 108, via telecommunications network 100. A browser may be used to view web pages, obtain files, conduct services such as instant messaging, etc. via telecommunications network 100. Browser session requests and responses typically comprise one or more data packets. Such packetized data is formatted and transported according to one or more network protocols, used in a given part of the network.

Figure 2 shows an example of a conventional request and response message flow used to obtain data from a server entity 108 over telecommunications network 100 at subscriber client device 102 during a browser session. At step 2a, a request for data is transmitted in the form of a browser session request from subscriber client device 102 into telecommunications network 100, directed at server 108 (for example using a uniform resource locator (URL) or internet protocol (IP) address). Telecommunications network 100 then routes the browser session request to server entity 108 as shown in step 2b; such routing is known in the art and may involve steps such as performing a domain name system (DNS) lookup (not shown) and forwarding by one or more network nodes (not shown).

Server entity 108 then processes the browser session request in order to generate a corresponding browser session response. The response may comprise



session control information such as status, and/or data such as a web page or a web page element (such as an image) if the browser session request requested such. At step 2c, server entity 108 transmits the generated browser session response into telecommunications network 100, directed at subscriber client device 102. 5 Telecommunications network 100 then routes the browser session response to subscriber client device 102 as shown in step 2d.

Some browser sessions may contain a series of multiple browser session requests and browser session responses. This will be the case, for example, if the subscriber browses to multiple web pages consecutively in the given browser session. 10 Often, a series of multiple requests and responses will be required to view a single web page. This is particularly true if different elements of the web page are hosted at different server entities. A common example is encountered when a web page includes one or more advertisement elements.

Figure 3 shows an example of a conventional telecommunications network 100, wherein the various elements of a given web page are hosted across multiple 15 server entities 108a and 108b. The functionality of subscriber client device 102, service provider network part 104, and wider network part 106 are the same as described previously in relation to Figure 1. However, telecommunications network 100 now comprises multiple server entities 108a and 108b. According to this 20 example, server entity 108a comprises a primary (page) server entity, which hosts a given web page. Primary (page) server entity 108a may be associated with a content publisher or similar entity. Server entity 108b comprises a secondary (element) server entity, which hosts one or more elements of the given web page hosted by primary (page) server entity 108a. Secondary (element) server entity 108b may be associated 25 with a third party content supplier, an advertiser or similar entity.

Figure 4 shows an example of a conventional request and response message flow used to obtain a complete web page hosted across multiple server entities 108a and 108b via telecommunications network 100 at subscriber client device 102. At step 4a, a browser session request for the given web page is transmitted from 30 subscriber client device 102 into telecommunications network 100, in this case using a URL for the desired web page. Telecommunications network 100 then routes the browser session request to primary (page) server entity 108a as shown in step 4b, for



example by performing a DNS lookup for the requested URL to obtain an IP address for primary (page) server entity 108a.

Primary (page) server entity 108a then processes the browser session request of step 4b in order to generate a corresponding browser session response. In this case, the response comprises a web page, which may include some but not all of the web page elements required to view the complete requested web page. For the one or more web page elements that are missing, primary (page) server entity 108a inserts instructions into the browser session response which serves to direct subscriber client device 102 to obtain the missing web page elements from secondary (element) server 108b. Such instructions may comprise one or more further URLs for the missing web page elements. At step 4c, primary (page) server entity 108a transmits the generated browser session response into telecommunications network 100, directed at subscriber client device 102. Telecommunications network 100 then routes the browser session response to subscriber client device 102 as shown in step 4d.

Upon receipt of browser session response 4d, subscriber client device 102 is able to display (or 'render') part of the requested web page. However, in order to render the complete requested web page, subscriber client device 102 must request the missing elements of the web page from secondary (element) server entity 108b. Hence, in step 4e, a browser session request for the one or more missing web page elements is transmitted from subscriber client device 102 into telecommunications network 100, in this case using a URL for the desired web page elements. Telecommunications network 100 then routes the browser session request of step 4e to secondary (element) server entity 108b as shown in step 4f, for example by performing a further DNS lookup for the requested URL to obtain an IP address for secondary (element) server entity 108b.

Secondary (element) server entity 108b then processes the browser session request of step 4f in order to generate a corresponding browser session response. In this case, the response comprises the one or more missing web page elements required to render the complete previously requested web page. At step 4g, secondary (element) server entity 108b transmits the generated browser session response into telecommunications network 100, directed at subscriber client device 102. Telecommunications network 100 then routes the browser session response of step 4g



to subscriber client device 102 as shown in step 4h. Upon receipt of browser session response 4h, subscriber client device 102 is able to render the entirety of the originally requested web page.

In some circumstances, the browser session response from primary (page) server 108a may include instructions which serve to direct subscriber client device 102 to obtain multiple missing web page elements from each of a plurality of secondary (element) server entities. In some circumstances, the browser session response from secondary (element) server 108b may include instructions which serve to direct subscriber client device 102 to obtain further missing web page elements from one or more tertiary server entities, and so on.

The examples above give an outline of conventional methods and systems for delivering data in a telecommunications network. It is an object of the present invention to provide improved methods and systems for delivering data in a telecommunications network.

15

#### Summary

According to a first aspect of the invention, there is provided the method of claim 1.

20

According to a second aspect of the invention, there is provided the apparatus of claim 21.

According to a third aspect of the invention, there is provided the computer software of claim 22.

25

Further features and advantages of the invention will become apparent from the following description of preferred embodiments of the invention, given by way of example only, which is made with reference to the accompanying drawings.

#### Brief Description of the Drawings

Figure 1 shows a system diagram according to the prior art;

Figure 2 shows a flow diagram according to the prior art;

30

Figure 3 shows a system diagram according to the prior art;

Figure 4 shows a flow diagram according to the prior art;

Figure 5 shows a system diagram according to embodiments;



Figure 6 shows a flow diagram according to embodiments;

Figure 7 shows a system diagram according to embodiments;

Figure 8 shows a flow chart according to embodiments.

## 5 Detailed Description

Embodiments of the present disclosure introduce an intermediate entity into a service provider network between a plurality of subscriber client devices and the wider network, whereby to enable the modification of standard data processing to provide enhanced functionality.

10 Figure 5 shows a telecommunications network 100 according to embodiments of the present disclosure. Telecommunications network 100 comprises at least service provider network part 104 and wider network part 106. Telecommunications network 100 may additionally comprise further network parts (not shown), and or border/gateway/caching entities (not shown) for translating between the various  
15 network protocols used in each network part, caching and serving commonly accessed data so as to reduce load between network parts and/or managing access to each network part. Service provider network part 104 is responsible for providing telecommunications services to a plurality of subscriber client devices, including at least subscriber client device 102. A subscriber client device may be configured to  
20 communicate voice and data. Examples of subscriber client devices may include personal computers, laptop computers, mobile telephones (including “smart phones”), tablet computers, personal digital assistants, etc.

According to embodiments, service provider network part 104 comprises a carrier network operated by a carrier. According to embodiments, service provider  
25 network part 104 comprises a mobile network (which may be in the form of a cellular network) operated by a mobile network operator (MNO). According to embodiments, service provider network part 104 comprises an internet service provider network operated by an internet service provider (ISP). Service provider network part 104 also comprises subscriber profile database 112. Subscriber profile database 112 stores  
30 subscriber profile data for a plurality of subscriber client devices and/or associated subscribers. Wider network part 106 is responsible for routing traffic (e.g. packetized data traffic encoded according to the Hypertext Transfer Protocol (HTTP)) to and



from one or more server entities accessible via wider network part 106, including at least server entity 108. According to embodiments service provider network part 104 further comprises optional event monitoring entity 111.

An intermediate entity 110 is introduced into service provider network 104 between subscriber client device 102 and wider network part 106. Intermediate entity 110 may be physically located in service provider network 104, or logically located in service provider network 104 through the use of, for example, a virtual or backhaul private network, but physically located/hosted elsewhere. Intermediate entity 110 is adapted to respond to receipt of an indication that a trigger event has occurred by initiating delivery of targeted content data associated with the indicated trigger event to one or more subscriber client devices.

Intermediate entity 110 is further adapted to communicate with subscriber profile database 112 to perform a lookup in subscriber profile database 112 in order to identify subscriber profile data for a given subscriber. According to embodiments, the contents of subscriber profile database 112 are defined by the service provider. According to embodiments, the lookup in subscriber profile database 112 is performed on the basis of a trigger event, such as an identifier for that trigger event or one or more characteristics associated with that trigger event. Of the plurality of subscriber client devices which are provided telecommunications services by service provider network part 104, the determination of which subscriber client device(s) should receive the targeted content data is performed on the basis of the results of a lookup performed in subscriber profile database 112 to identify subscriber profile data for one or more subscribers associated with the indicated trigger event, including at least the subscriber associated with subscriber client device 102. Having identified the given subscriber, delivery of targeted content data is initiated to at least one subscriber client device 102 of the one or more subscriber client devices associated with the given subscriber. Targeted content data may be routed to subscriber client device 102 on the basis of a unique identifier associated with the subscriber client device retrieved from subscriber database 112, such as an email address, an IP address or a telephone dialling number such as a Mobile Subscriber Integrated Services Digital Network Number (MSISDN).



By initiating delivery of targeted content data at intermediate entity 110 in service provider network part 104, embodiments are in contrast to known content delivery techniques wherein delivery may be initiated by one or more of: a browser on a subscriber client device (according to code running locally on the browser), a server (during construction of a browser session response), a border entity responsible for managing access to a given network part, a gateway entity responsible for translating between network protocols used in different network parts, a caching entity responsible for caching and serving data commonly requested between network parts, a network device outside of the carrier entity, or an encoding entity responsible for modifying browser session traffic for efficient routing. Thus, in certain embodiments, the initiation is not performed by a browser on a subscriber client device, by a server during construction of a browser session response, a border entity responsible for managing access to a given network part, a gateway entity responsible for translating between network protocols used in different network parts, a caching entity responsible for caching and serving data commonly requested between network parts, a network device outside of the carrier entity, and/or an encoding entity responsible for modifying browser session traffic for efficient routing.

According to embodiments, service provider network 104 comprises a routing fabric, responsible for routing traffic between subscriber client device 102 and wider network part 106. The service provider network 104 may include a routing system that selects the route for calls or data. According to embodiments, intermediate entity 110 is located in the routing fabric of service provider network 104. Conventionally, the routing fabric of the service provider network is reserved for routing only, and not the initiation of delivery of targeted content data. However, embodiments adapt the routing fabric through the introduction of intermediate entity 110.

Figure 6 illustrates the operation of intermediate entity 110 in response to the occurrence of a trigger event. At step 600, intermediate entity 110 receives an indication that the trigger event has occurred. Having received the indication that the trigger event has occurred of step 600, intermediate entity 110 performs a lookup in step 6a in subscriber profile database 112 located within service provider network 104 to identify subscriber profile data for at least a given subscriber associated with the



indicated trigger event. The results of the lookup are received by intermediate entity 110 from subscriber profile database 112 in step 6b.

The results of the lookup received in step 6b comprise subscriber profile data for one or more subscribers, including at least the given subscriber, and/or data for one or more associated subscriber client devices, including at least subscriber client device 102. Intermediate entity 110 then initiates delivery of targeted content data to at least one of the one or more subscriber client devices associated with the given subscriber, including at least subscriber client device 102 as shown in step 6c.

According to embodiments, the indication that the trigger event has occurred is received from an entity within service provider network part 104, such as event monitoring entity 111. The trigger event relates to a change in network service status, which when detected by event monitoring entity 111 results in an indication that the network service status has changed being sent to intermediate entity 110. Intermediate entity 110 then performs a lookup in subscriber database 112 to identify subscriber profile data for one or more subscribers who should be notified of changes to the network service status, and initiate delivery of appropriate targeted content data to at least one subscriber client device associated with the one or more identified subscribers.

According to embodiments, the targeted content is generated by intermediate entity 100 on the basis of identified subscriber profile data and the indicated trigger event. According to other embodiments, the targeted content data is generated, at least in part, on the basis of data stored in a targeted content data database (not shown) comprised in the service provider network.

According to embodiments, the targeted content data is generated at least on the basis of data received from a network entity located outside the service provider network in response to occurrence of the indicated trigger event. For example, in response to receipt of an indication that the trigger event has occurred, intermediate entity 110 may request data for use in generating the targeted content from server entity 108 via wider network part 106. Alternatively, data for use in generating the targeted content may be transmitted from server entity 108 to intermediate entity 110 in response to the trigger event occurring. According to embodiments, this data could be transmitted either simultaneously to, or subsequent to, the indication that the



trigger event has occurred. For example, an advertiser may transmit an indication that a certain trigger event has occurred along with data for use in generating suitable advertisement content.

5 According to embodiments, the targeted content data is generated on the basis of an identifier associated with the subscriber client device to which it will be delivered. In this way, the targeted content can be optimised for the device on which it will be received. According to embodiments, the identifier relates to a type of subscriber client device. The type could relate to whether the device is a mobile telephone, tablet, laptop, personal computer, etc or the particular model or release of mobile telephone, etc. For example, in embodiments where the targeted content data comprises an image, a higher resolution version of the targeted content could be provided to a tablet device, whilst a lower resolution version of the targeted content could be provided to a mobile telephone device. According to further such embodiments, the identifier relates to a capability of the subscriber client device. This could include whether the device is capable of displaying image data, playing audio content, rendering video content etc., thereby allowing appropriate targeted content data to be generated.

10 According to embodiments, different targeted content data is generated for each of two subscriber client devices associated with a given subscriber, and delivery of the data is initiated accordingly. In such embodiments, the generating comprises generating first targeted content data on the basis of a first identifier associated with the first subscriber client device, and generating second targeted content data on the basis of a second identifier associated with the second subscriber client device. The initiation then comprises initiating delivery of the first targeted content data to the first subscriber client device and initiating delivery of the second targeted content data to the second subscriber client device. In embodiments, the identifiers for each of the two subscriber client devices are stored in subscriber profile database 112 and retrieved by intermediate entity 110 during the lookup performed in response to occurrence of the trigger event.

15 According to embodiments, the targeted content data comprises a web page. According to embodiments, the targeted content data comprises a web page element. According to embodiments, the targeted content data comprises advertisement



content. According to embodiments, the targeted content data comprises an image. According to embodiments, the targeted content data comprises natural language text data.

5 According to embodiments, the initiation of delivery of the targeted content data comprises transmitting the targeted content data to subscriber client device 102. According to further embodiments, the initiation of delivery of the targeted content data comprises transmitting a targeted content availability notification to subscriber client device 102, to notify subscriber client device 102 as to the availability of the targeted content data. In such embodiments the targeted content data may be hosted  
10 at intermediate entity 110, server entity 108, or a further entity in telecommunications network 100 (not shown). In such embodiments, subscriber client device 102 is informed as to the availability of the targeted content data, which is then able to request the targeted content data via conventional processing operations. According to embodiments, the initiation comprises utilising a push notification system to  
15 instruct subscriber client device 102 to request the targeted content data from an appropriate location in telecommunications network 100.

According to embodiments, the initiation of delivery of the targeted content data comprises inserting the targeted content data into in an ongoing browser session conducted by subscriber client device 102. According to such embodiments, service  
20 provider network 104 is configured to route browser session traffic between subscriber client device 102 and wider network part 106 via intermediate entity 110. The initiating comprises modifying at least one of a browser session request and a browser session response whereby to cause the targeted content data to be inserted into the ongoing browser session. The modification may comprise one or more of:  
25 modifying the browser session response to include the targeted content data, modifying the browser session response to include an instruction to request the targeted content data, modifying the browser session request to include a request for the targeted content data, and modifying a browser session request whereby to trigger the inclusion of an instruction to request the targeted content data in a corresponding  
30 browser session response. This may comprise modifying part of the data, a header or another object such as a cookie.



According to embodiments, the trigger event has at least one associated trigger event attribute, and the subscriber profile data comprises at least one subscriber profile attribute associated with a given subscriber. According to embodiments, performing the lookup in subscriber profile database 112 comprises: comparing at least one trigger event attribute associated with the trigger event to at least one subscriber profile attribute associated with a given subscriber. On the basis of the comparison, a match may be determined between the trigger event and the given subscriber. Where a match is determined, subscriber profile data for that subscriber can be identified, and delivery of targeted content initiated to a subscriber client device associated with the identified subscriber.

According to embodiments, the trigger event attributes and/or subscriber profile attributes identify a given hobby, topic or interest associated with the subscriber.

According to embodiments, the trigger event attributes and/or subscriber profile attributes identify a given browsing behaviour characteristic associated with the subscriber, such as a regularly visited website or regularly used service. Such a browsing behaviour characteristic may be determined by logging and analysing traffic in relation to the given subscriber client device and/or the associated subscriber.

According to embodiments, subscribers define their associated subscriber profile attributes in order to receive relevant content, and/or can subscribe with the service provider to receive specific content. In embodiments, on the basis of initiating delivery of the targeted content, revenue may be obtained from the subscriber for providing the content.

According to embodiments where delivery of the targeted content is initiated on behalf of an advertising entity, revenue may be obtained from an advertiser for carrying out the initiating, i.e. on the basis of the initiating of the delivery of the targeted content. Having further information about the subscriber, such as that stored in subscriber profile database 112, allows the advertisement server entity to serve adverts only to those subscribers for which the advert is highly relevant. More highly relevant adverts can lead to generation of increased revenue for advertisers or advertisement brokers. Further, providing more highly relevant adverts can also lead



to increased business value for advertisers or advertisement brokers, for example via increased brand awareness.

According to embodiments, the results of the lookup in subscriber profile database 112 comprise one or more subscriber targeted content access rules associated with the subscriber and/or the associated subscriber client device, which influence the targeted content received by the subscriber client device.

According to embodiments, the results of the lookup in subscriber profile database 112 comprise one or more restrictions on targeted content which should be applied to the given subscriber and/or associated subscriber client device. Such restrictions could comprise an age related restriction for filtering age-restricted targeted content, a list of targeted content types which should not be delivered or some other form of targeted content filter for preventing delivery of undesired targeted content.

According to embodiments, the results of the lookup in the subscriber profile database comprise one or more special access requirements associated with the given subscriber and/or associated subscriber client device. For example, the results of the lookup in the subscriber profile database may indicate that the given subscriber is colour blind, in which case the targeted content can be generated using a suitable colour palette. Further, the results of the lookup in the subscriber profile database may indicate that the given subscriber is deaf, in which case the targeted content can be generated without audio, or with subtitles provided.

According to embodiments, the results of the lookup in the subscriber profile database comprise a natural language preference associated with the given subscriber and/or associated subscriber client device, in which case, the targeted content can be generated with a translated version of the content instead.

According to embodiments, subscriber profile data is further identified on the basis of the geographical location of the subscriber client device. The geographical location of the subscriber client device can be obtained from known service provider networking operations, such as cell-tower location lookup, and/or cell trilateration. Hence, intermediate entity 110 can provide targeted content data to those subscriber client devices identified in subscriber profile database 112 that are also near a given geographical location, or in a given geographical area. According to further



embodiments, the targeted content data may be generated on the basis of the geographical location of the subscriber client device, in order to provide more highly relevant targeted content data.

According to embodiments, the subscriber database is remotely configurable. The subscriber database may be configured by a subscriber database administration entity located within the service provider network, for example operated by an employee of the service provider. Alternatively, the subscriber database may be configured by a subscriber database administration entity located outside the service provider network, for example operated by a contractor, a subscriber, a law enforcement entity, a regulatory body, etc. In such embodiments, the subscriber database may be remotely configured in response to receipt of a subscriber database configuration message, for example from a subscriber database administration entity.

According to embodiments, intermediate entity 110 is further configured to initiate delivery of the targeted content data according to one or more targeted content delivery rules, in combination with the indication of the trigger event having occurred and the subscriber profile data. According to embodiments, the targeted content delivery rules are defined by the service provider. According to further embodiments, the targeted content delivery rules are initially defined by an equipment supplier, with subsequent targeted content delivery rules being defined by the service provider. According to further embodiments, the defined targeted content delivery rules are configured by a rules administration entity. Embodiments of the present disclosure utilise a rules engine to initiate delivery of the targeted content data according to the targeted content delivery rules. Rules engine is comprised in intermediate entity 110, for example in the form of an installed software application.

According to embodiments, intermediate entity 110 holds the one or more targeted content delivery rules in operating memory. According to some embodiments, intermediate entity 110 obtains at least one of the one or more targeted content delivery rules in response to querying a rules database located within the service provider network. In some embodiments, the one or more targeted content delivery rules are remotely configurable. The targeted content delivery rules may be configured by a rules administration entity located within the service provider network, for example operated by an employee of the service provider. Alternatively,



the targeted content delivery rules may be configured by a rules administration entity located outside the service provider network, for example operated by a contractor, a subscriber, a law enforcement entity, a regulatory body, etc. In such embodiments, the one or more targeted content delivery rules may be remotely configured in response to receipt of a rule configuration message, for example from a rules administration entity.

Figure 7 shows telecommunications network 100 according to embodiments. The functionality of subscriber client device 102, service provider network part 104, and wider network part 106, server entity 108, intermediate entity 110 and subscriber profile database 112 are the same as described above in relation to Figure 5. However, in the embodiments shown in Figure 7, service provider network further comprises targeted content database 118, which contains the one or more items of targeted content, and rules database 120, which contains the one or more targeted content delivery rules. Subscriber database administration entity 116 is capable of configuring the subscriber profile database 112 by transmitting a subscriber database configuration message to subscriber profile database 112. This may occur via a direct connection to service provider network 104 (as shown) or via wider network part 106. Rules administration entity 122 is capable of configuring the one or more targeted content delivery rules by transmitting a rules database configuration message to rules database 120. This may occur via a direct connection to service provider network 104 (as shown) or via wider network part 106.

Figure 8 is a flow diagram that describes embodiments from the perspective of intermediate entity 110. At step 800, an indication that a trigger event has occurred is received. At step 802, a lookup is performed in the subscriber profile database to identify subscriber profile data for at least a given subscriber associated with the indicated trigger event. At step 804, delivery of targeted content data associated with the indicated trigger event is initiated to at least one of the one or more subscriber client devices associated with the given subscriber.

Embodiments comprise a method for use in the provision of targeted content data in a telecommunications network, the telecommunications network comprising a carrier network operated by a carrier responsible for providing telecommunications services to a plurality of subscribers, each subscriber having one or more associated



subscriber client devices, the carrier network comprising a subscriber profile database containing subscriber profile data specific to each subscriber and/or each associated subscriber client device, the method comprising, at an entity in the carrier network:

receiving an indication that a trigger event has occurred;

5 performing a lookup in the subscriber profile database to identify subscriber profile data for at least a given subscriber associated with the indicated trigger event; and

10 initiating delivery of targeted content data associated with the indicated trigger event to at least one of the one or more subscriber client devices associated with the given subscriber.

The above embodiments are to be understood as illustrative examples of the invention. Further embodiments of the invention are envisaged. For example, whilst the above embodiments have been described in relation to packetized data traffic such as HTTP data, it is to be understood that the methods and systems disclosed herein are  
15 also applicable to any similar or equivalent protocol, in particular any request/response based protocol. It is to be understood that any feature described in relation to any one embodiment may be used alone, or in combination with other features described, and may also be used in combination with one or more features of any other of the embodiments, or any combination of any other of the embodiments.  
20 Furthermore, equivalents and modifications not described above may also be employed without departing from the scope of the invention, which is defined in the accompanying claims.



Claims

1. A method for use in the provision of targeted content data in a telecommunications network, the telecommunications network comprising a service provider network operated by a service provider responsible for providing telecommunications services to a plurality of subscribers, each subscriber having one or more associated subscriber client devices, the service provider network comprising a subscriber profile database containing subscriber profile data specific to each subscriber and/or each associated subscriber client device, the method comprising, at an entity in the service provider network:

receiving an indication that a trigger event has occurred, wherein the trigger event relates to a change in network service status;

performing a lookup in the subscriber profile database to identify subscriber profile data for at least a given subscriber associated with the indicated trigger event and who should be notified of changes to the network service status; and

initiating delivery of targeted content data associated with the indicated trigger event to at least one of the one or more subscriber client devices associated with the given subscriber, wherein the targeted content data is appropriate for notifying the change in network service status;

wherein the indication that the trigger event has occurred is received from within the service provider network; and

wherein the initiating comprises modifying at least one of a browser session request and a browser session response in an ongoing browser session conducted by the at least one subscriber client device.

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2. A method according to claim 1, comprising generating the targeted content data at least on the basis of the identified subscriber profile data and the indicated trigger event.

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3. A method according to claim 1 or 2, comprising generating the targeted content data at least on the basis of data retrieved from a targeted content data database comprised in the service provider network.

4. A method according to any of claims 1 to 3, comprising generating the targeted content data at least on the basis of data received from a network entity located outside the service provider network in response to occurrence of the indicated trigger event.

5. A method according to any preceding claim, comprising generating the targeted content data at least on the basis of an identifier associated with the at least one of the one or more subscriber client devices associated with the given subscriber.

6. A method according to claim 5, wherein the identifier relates to a type of the at least one of the one or more subscriber client devices.

7. A method according to claim 5 or 6, wherein the identifier relates to a capability of the at least one of the one or more subscriber client devices.

8. A method according to any of claims 5 to 7, comprising:  
generating first targeted content data on the basis of a first identifier associated with a first subscriber client device associated with the given subscriber;  
and

generating second targeted content data on the basis of a second identifier associated with a second subscriber client device associated with the given subscriber,  
wherein the initiation comprises initiating delivery of the first targeted content data to the first subscriber client device and initiating delivery of the second targeted content data to the second subscriber client device, and

wherein the first targeted content data and the second targeted content data are different.

9. A method according to any preceding claim, wherein the modification comprises one or more of:

modifying the browser session response to include the targeted content data,

modifying the browser session response to include an instruction to request the targeted content data,

modifying the browser session request to include a request for the targeted content data, and

5 modifying a browser session request whereby to trigger the inclusion of an instruction to request the targeted content data in a corresponding browser session response.

10 10. A method according to any preceding claim, wherein the browser session request comprises an HTTP request and/or the browser session response comprises an HTTP response.

15 11. A method according to any preceding claim, wherein the targeted content data comprises a web page.

12. A method according to any preceding claim, wherein the targeted content data comprises a web page element.

20 13. A method according to any preceding claim, wherein the targeted content data comprises advertisement content.

14. A method according to any preceding claim, wherein performing the lookup comprises:

25 comparing at least one trigger event attribute associated with the trigger event to at least one subscriber profile attribute associated with the given subscriber; and

determining, on the basis of the comparison, a match between the trigger event and the given subscriber, whereby to identify subscriber profile data for the given subscriber.

30 15. A method according to claim 14, wherein one or more of the trigger event attributes identify a given hobby, topic or interest associated with the subscriber.



16. A method according to claim 14 or 15, wherein one or more of the trigger event attributes identify a given browsing behaviour characteristic associated with the subscriber.

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17. A method according to any preceding claim, comprising, on the basis of the delivery, obtaining revenue from one or more of:

the provider of said targeted content;

the subscriber;

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an advertiser,

an advertisement broker,

the service provider.

18. A method according to any preceding claim, wherein the service provider network comprises one or more of:

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a carrier network,

a mobile network,

a cellular network, and

an internet service provider network.

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19. A method according to any preceding claim, wherein the service provider network comprises a routing fabric, and wherein the intermediate entity is located in the routing fabric of the service provider network.

20. A method according to any preceding claim wherein the intermediate entity is not comprised by:

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the subscriber client device,

the server entity,

a border entity responsible for managing access to a given network part,

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a gateway entity responsible for translating between network protocols used in different network parts,

a caching entity responsible for caching and serving data commonly requested between network parts, or

an encoding entity responsible for modifying browser session traffic for efficient routing.

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21. Apparatus for use in the provision of targeted content data in a telecommunications network, the telecommunications network comprising a service provider network operated by a service provider responsible for providing telecommunications services to a plurality of subscribers, each subscriber having one or more associated subscriber client devices, the service provider network comprising a subscriber profile database containing subscriber profile data specific to each subscriber and/or each associated subscriber client device, the apparatus comprising, at least one processor, and at least one memory including computer program code, the at least one memory and the computer program code being configured to, with the at least one processor, cause the apparatus at least to, at an entity in the service provider network:

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receive an indication that a trigger event has occurred, wherein the trigger event relates to a change in network service status;

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perform a lookup in the subscriber profile database to identify subscriber profile data for at least a given subscriber associated with the indicated trigger event and who should be notified of changes to the network service status; and

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initiate delivery of targeted content data associated with the indicated trigger event to at least one subscriber client device associated with the given subscriber, wherein the targeted content data is appropriate for notifying the change in network service status;

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wherein the indication that the trigger event has occurred is received from within the service provider network; and

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wherein the initiating comprises modifying at least one of a browser session request and a browser session response in an ongoing browser session conducted by the at least one subscriber client device.

22. Computer software adapted to perform a method for use in the provision of targeted content data in a telecommunications network, the telecommunications network comprising a service provider network operated by a service provider responsible for providing telecommunications services to a plurality of subscribers, each subscriber having one or more associated subscriber client devices, the service provider network comprising a subscriber profile database containing subscriber profile data specific to each subscriber and/or each associated subscriber client device, the method comprising, at an entity in the service provider network:

10 receiving an indication that a trigger event has occurred, wherein the trigger event relates to a change in network service status;

performing a lookup in the subscriber profile database to identify subscriber profile data for at least a given subscriber associated with the indicated trigger event and who should be notified of changes to the network service status; and

15 initiating delivery of targeted content data associated with the indicated trigger event to at least one subscriber client device associated with the given subscriber, wherein the targeted content data is appropriate for notifying the change in network service status;

20 wherein the indication that the trigger event has occurred is received from within the service provider network; and

wherein the initiating comprises modifying at least one of a browser session request and a browser session response in an ongoing browser session conducted by the at least one subscriber client device.