

METHOD AND PACKET SWITCHED COMMUNICATION NETWORK WITH ENHANCED SESSION ESTABLISHMENT

TECHNICAL FIELD

[0001] The present invention relates to networks and methods for increasing the speed of session establishment.

DESCRIPTION OF THE PRIOR ART

[0002] The Technical Specification 3GPP TS 23.228 V5.0.0 (2001-04) sets forth a mechanism for providing multimedia services in packet switched communication networks. The Technical Specification is incorporated herein by reference in its entirety. Packet switched communication networks in accordance with the aforementioned Technical Specification, while robust in providing services utilizing the session initiation protocol (SIP), suffer from a slowed session establishment when communications during session establishment involve low speed communications such as low capacity access networks. An example of this occurs when user equipment (UE) of a caller in a robust packet switched communication network wishes to establish a session with UE of a callee in a lower capacity access or service network as a consequence of a large capacity payload being transmitted by the UE of the caller. The large capacity payload slows down the session establishment with the callee in the lower capacity access or service network as a consequence of the lower capacity slower communications therein. Currently, there is no technique for enhancing the speed of session establishment when large data payloads are involved during session

establishment, especially when the UE of the callee is in a lower capacity slower access network.

[0003] WO 26729 discloses providing information about an end user/terminal capabilities to the sender so that the sender may refrain from sending a wrong type, such as too large of a data file, during transmission.

[0004] The SIP RFC discloses that a terminal may place a URL in a SIP transmission instead of payload.

[0005] WO 00/51306 discloses a network which may replace a payload with a URL.

[0006] WO 27537 discloses the storing and forwarding of payloads using the SIP INFO messages.

DISCLOSURE OF INVENTION

[0007] The present invention is a method and network for session establishment in a packet switched communication network having a session set up control entity in which the speed of session establishment is increased. An increase in the speed of session establishment is produced by reducing the information content (data payload) transmitted from the session establishment control entity, such as, but not limited to, by a call state control function (CSCF) or a proxy call state control function (PCSCF) to enhance the speed of session establishment. The removed information is at least some and preferably all information which is not necessary for session establishment. The session establishment control entity, processes the request from UE of the caller to

remove information therefrom during the request for session establishment which would slow the session establishment with the UE of the callee.

[0008] As used herein, slowing of session establishment is descriptive of an unacceptable time required for completing session establishment caused by the data payload transmitted from the caller UE to the callee UE associated with the session establishment. The actual size of the data payload which causes unacceptable slow down varies in dependence upon the network throughput between the caller UE and the callee UE and is proportional to the network throughput such that the slower the data connection between the caller UE and the callee UE, the smaller the size of data payload which causes the unacceptable slowdown. The relative speed of session establishment, which is unacceptably slow, triggering removal of data from the payload, may be determined either by user requirements (e.g. the speed at which the caller and/or the callee considers completion of call set up to be acceptable) or from network parameters(e.g. call set up must be completed within a specified time).

[0009] The session establishment control entity processes information to be transmitted from the caller UE to the callee UE during session establishment to produce a session establishment information having a smaller payload than the original information by removing from the original information to be transmitted from the caller UE to the callee UE an amount of information which would slow the session establishment if transmitted to the callee UE during session establishment. Thereafter, at an entity in the packet switched communication network, which may be a separate server, the removed information is stored for

later transmission to the callee UE after session establishment is completed.

Thereafter, the session establishment information, which has less content and payload than the original information is transmitted by the caller UE to the callee UE, which is processed by the callee UE, to complete session establishment.

[0010] The aforementioned server or other storage has an addressable location therein. The address of where the removed information is stored in the packet switched communication network may be included in the session establishment information transmitted to the callee UE or the removed information may be automatically forwarded to the callee UE after session establishment is completed from the storage in the packet switched communication network under control of the session establishment control entity. The transmission from the caller UE to the callee UE during session establishment may without limitation use the SIP INVITE message and the later transmission of the removed information may without limitation use the SIP INFO message. The callee UE may send a transmission, after session establishment is completed, to the address where the removed information is stored in the packet switched communication network which then transmits the removed information to the callee UE. Either methodology of transmitting the removed information to the callee UE avoids session establishment delay in view of the transmission being completed outside of the time interval during which session establishment occurs. The callee UE may be within another network, such as a packet switched data network, lower capacity access network, or service network having a lower data transmission

capacity than the packet switched data network, but the invention is not limited thereto.

[0011] A method of session establishment in a packet switched communication network having a session establishment control entity in accordance with the invention includes at the session establishment control entity processing information to be transmitted from caller user equipment to callee user equipment during session establishment to produce session establishment information by removing, from the information to be transmitted from the caller user equipment to the caller user equipment, information not necessary for session establishment, which would slow the session establishment if transmitted to the callee user equipment during session establishment; storing the information removed from the information to be transmitted from the caller user equipment to the callee user equipment; and completing session establishment by transmitting the session establishment information to the callee user equipment which is processed by the callee user equipment to complete session establishment.

[0012] The removed information may be stored in the packet switched communication network at an addressable location therein and an address of where the removed information is stored in the packet switched communication network may be included with the session establishment information transmitted to the callee user equipment; the callee user equipment may send a transmission after session establishment to the address; and the packet switched communication network may transmit the removed information to the callee user equipment from the address. The session establishment control entity may

transmit the removed information to the callee user equipment after session establishment is complete. The transmission from the caller user equipment to the callee user equipment during session establishment may use the SIP INVITE message and the later transmission of the removed information may use the SIP INFO message. The session establishment control entity may be one of a call state control function (CSCF) or a proxy call state control function (PCSCF). The address may be a universal resource locator (URL). The information may be stored at a server in the packet switched communication network and the callee user equipment may be within another network having a lower data transmission capacity than the packet switched data network.

[0013] A packet switched communication network in accordance with the invention includes a session establishment control entity which processes information to be transmitted from a caller user equipment to a callee user equipment during session establishment to produce session establishment information by removing, from the information to be transmitted from the caller user equipment to the callee user equipment, information not necessary for session establishment, which would slow the session establishment if transmitted to the callee user equipment during the session establishment; and a storage which stores the information removed from the information to be transmitted from the caller user equipment to the callee user equipment; and wherein session establishment is completed by transmitting the session establishment information to the callee user equipment which is processed at the callee user equipment to complete session establishment between the caller user equipment and the callee

user equipment.

[0014] The removed information may be stored in the packet switched communication network at an addressable location therein and an address of where the removed information is stored in the packet switched communication network may be included with the session establishment information transmitted to the callee user equipment; the callee user equipment may send a transmission after session establishment to the address and the packet switched communication network may transmit the removed information to the callee from the address. The session establishment control entity may transmit the removed information to the caller user equipment after session establishment is complete. The transmission from the caller user equipment to the callee user equipment during session establishment may use the SIP INVITE message and the later transmission of the removed information may use the SIP INFO message. The session establishment control entity may be one of a call state control function (CSCF) or a proxy call state control function (PCSCF). The address may be a universal resource locator (URL). The storage may be a server in the packet switched communication network and the callee user equipment may be within another packet switched data network having a lower data transmission capacity than the packet switched data network.

BRIEF DESCRIPTION OF THE DRAWING

[0015] Fig. 1 illustrates a block diagram of the network and process of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0016] Fig. 1 illustrates a preferred embodiment of the present invention but it should be understood that the illustrated embodiment is only exemplary of a network and processing which may be used with the practice of the invention. The network(s) 10, which may include NET#1 and NET#2, include a network entity 12 which is a CSCF or PCSCF to which the UE#1 of a caller 13 transmits an INVITE with a large payload. The caller 13 of the UE#1 is desirous of setting up a session, such as a multimedia session involving a large data payload with UE#2 of a callee 14, which may be within a single packet switched communication network 10 or, alternatively, in another packet switched communication network such as NET#2. As illustrated, the first network NET#1 may be a high capacity high speed robust packet switched data network and the second network NET#2 may be a lower capacity, slower speed, and less robust network which has insufficient bandwidth to rapidly transport the large data payload involved with session establishment of the UE#1 of the caller 13, such as a slower speed packet switched data network, access network, or service network. The payload of UE#1 of the caller 13 is so large that session establishment between UE#1 and UE#2, whether in one network 10 or within two networks NET#1 and NET#2, is slowed to a degree that is undesirable or unacceptable from the standpoint of preferences of the caller 13 using UE#1 indicated in session setup information such as time limits for completing response establishment, network parameters setting time limits for completion of session establishment or callee preferences or capabilities which

are stored in the network. If the caller and the callee are in the same network, the session establishment control entity may be a CSCF. Alternatively, if the UE#1 of the caller 13 and the UE#2 of the callee 14 are in a different network, the session establishment control entity in NET#2 may be a PCSCF with CSCF being in network #1 as indicated by the dotted phantom circle CSCF 15.

[0017] An example of session establishment in at least one packet switched communication network in accordance with the invention is explained with reference to Fig. 1 using the SIP protocol communications, but it should be understood that the invention is not limited to the SIP protocol. The UE#1 of the caller 13 sends an INVITE message to the CSCF 15 or PCSCF 12 which contains a data payload which is sufficiently sizable that if the entire payload were transmitted from the caller 13 to the callee 14, session establishment would be unacceptably slowed from either or both of the caller's and callee's preferences or network parameters because of the size of the data transmission which would be required to be sent to the UE#2 during session establishment. The removed information is at least some and preferably all information which is not necessary for session establishment. Typically, the UE#2 of the callee 14 is located in NET#2 network which may be characterized as a lower capacity and therefore, slower packet switched communication network, access network, or service network. The CSCF 12 or PCSCF 15 performs extraction of the large payload information which would slow down the session establishment and causes the storage in a network entity 16 which may be a server or other storage including being within the CSCF 12 or PCSCF 15. After storage is complete, the INVITE

message is transmitted to the UE#2 of the callee 14 without the extracted information and to which may be added the address of the storage 16. Thereafter, session establishment occurs as indicated by the dotted line. After session establishment is completed, the UE#2 of the callee 14 sends a 200 OA to the INVITE message. Thereafter, the CSCF or PCSCF 12 sends an acknowledgement back to the UE#2 of the callee 14 which optionally may include the network address of the storage 16 at which the extracted information is stored. Thereafter, the information extracted from the original information large payload, which is stored in the storage 16, is transmitted to the UE#2 of the callee 14 as part of a SIP INFO message.

[0018] The transmission of the extracted information may be either in response to the receipt of the address from the UE#2 of the callee 14 of the storage 16 or the CSCF or PCSCF 12 determining a time, after session establishment is completed based upon the receipt of the 200 OK to the INVITE message being received, to send the extracted information by a SIP INFO message or otherwise. After receipt of the information by the user equipment #2 of the callee 14, a 200 OK message is sent back to the CSCF or PCSCF 12 that the extracted information has been received.

[0019] The foregoing session establishment mechanism provides the benefit of increasing the speed of session establishment especially with session establishment between UE#1 of caller 13 in the first higher speed packet switched communication network, such as NET#1 and UE#2 of callee 14 in a slower packet switched communication network such as NET#2 or other slower network.

[0020] While the invention has been described in terms of its preferred embodiments, it should be understood that numerous modifications may be made thereto without departing from the spirit and scope of the present invention. It is intended that all such modifications fall within the scope of the appended claims.

CLAIMS

What is claimed is:

1. A method of session establishment in a packet switched communication network having a session establishment control entity comprising:
 - at the session establishment control entity processing information to be transmitted from caller user equipment to callee user equipment during session establishment to produce session establishment information by removing, from the information to be transmitted from the caller user equipment to the callee user equipment, information not necessary to session establishment, which would slow the session establishment if transmitted to the callee user equipment during session establishment;
 - storing the information removed from the information to be transmitted from the caller user equipment to the callee user equipment; and
 - completing session establishment by transmitting the session establishment information to the callee user equipment which is processed by the callee to complete session establishment.
2. A method in accordance with claim 1 wherein:
 - the removed information is stored in the packet switched communication network at an addressable location therein and an address of where the removed information is stored in the packet switched communication

network is included with the session establishment information transmitted to the callee user equipment;

the callee user equipment sends a transmission after session establishment to the address; and

the packet switched communication network transmits the removed information to the callee user equipment from the address.

3. A method in accordance with claim 1 wherein:

the transmission of the session establishment information uses a SIP INVITE message.

4. A method in accordance with claim 1 wherein:

the session establishment control entity transmits the removed information to the callee after session establishment is complete.

5. A method in accordance with claim 4 wherein:

the transmission of the removed information uses the SIP INFO message.

6. A method in accordance with claims 1-5 wherein:

the session establishment control entity is one of a call state control

function (CSCF) or a proxy call state control function (PCSCF).

7. A method in accordance with claims 1-6 wherein:
the address is a universal resource locator (URL).
8. A method in accordance with claims 1-7 wherein:
the removed information is stored at a server in the packet switched communication network.
9. A method in accordance with claims 1-8 wherein:
the callee user equipment is within another network having a lower data transmission capacity than the packet switched data network.
10. A method in accordance with claim 9 wherein:
the session establishment control entity is a proxy call state control function (PCSCF).
11. A packet switched communication network comprising:
a session establishment control entity which processes information to be transmitted from caller user equipment to a callee user equipment during session establishment to produce session establishment information by removing, from the information to be transmitted from the caller user equipment to the callee user equipment, information not necessary to establishment of the session, which

would slow the session establishment if transmitted to the callee during the session establishment; and

a storage which stores the information removed from the information to be transmitted from the caller user equipment to the callee user equipment; and wherein

session establishment is completed by transmitting the session establishment information to the callee user equipment which is processed at the callee user equipment to complete session establishment between the caller user equipment and the callee user equipment.

12. A network in accordance with claim 11 wherein:

the removed information is stored in the packet switched communication network at an addressable location therein and an address of where the removed information is stored in the packet switched communication network is included with the session establishment information transmitted to the callee user equipment;

the callee user equipment sends a transmission after session establishment to the address; and

the packet switched communication network transmits the removed information to the callee user equipment from the address.

13. A network in accordance with claims 11 and 12 wherein:
the transmission of session establishment information uses a SIP
INVITE message.
14. A network in accordance with claim 13 wherein:
the session establishment control entity transmits the removed
information to the callee after session establishment is complete.
15. A network in accordance with claims 11-14 wherein:
the transmission of the removed information uses the SIP INFO
message.
16. A network in accordance with claims 11-15 wherein:
the session establishment control entity is one of a call state control
function (CSCF) or a proxy call state control function (PCSCF)
17. A network in accordance with claims 11-16 wherein:
the address is a universal resource locator (URL).
18. A system in accordance with claims 11-17 wherein:
the storage is a server in the packet switched communication
network.

19. A network in accordance with claims 11-18 wherein:
the callee user equipment is within another network having a lower data transmission capacity than the packet switched data network.
20. A network in accordance with claim 19 wherein:
the session establishment control entity is a proxy call state control function (PCSCF).