

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
2 July 2009 (02.07.2009)

PCT

(10) International Publication Number  
**WO 2009/080463 A1**

(51) International Patent Classification:  
*H04L 29/06* (2006.01) *H04L 12/18* (2006.01)

(74) Common Representative: NOKIA SIEMENS NETWORKS OY; COO RTP IPR / Patent Administration, 80240 Munich (DE).

(21) International Application Number:  
PCT/EP2008/066835

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(22) International Filing Date:  
4 December 2008 (04.12.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
07150204.1 20 December 2007 (20.12.2007) EP

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant (for all designated States except US): NOKIA SIEMENS NETWORKS OY [FI/FI]; Karaportti 3, FIN-02610 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): JERICHOW, Anja [DE/DE]; Adolf-Baeyer-Damm 34, 81735 München (DE). NÖSEKABEL, Holger [DE/DE]; Schwartzkopffstr. 19, 10115 Berlin (DE).

Published:  
— with international search report

(54) Title: PROVIDING A DOWNLOAD SERVICE IN COMMUNICATIONS SYSTEM

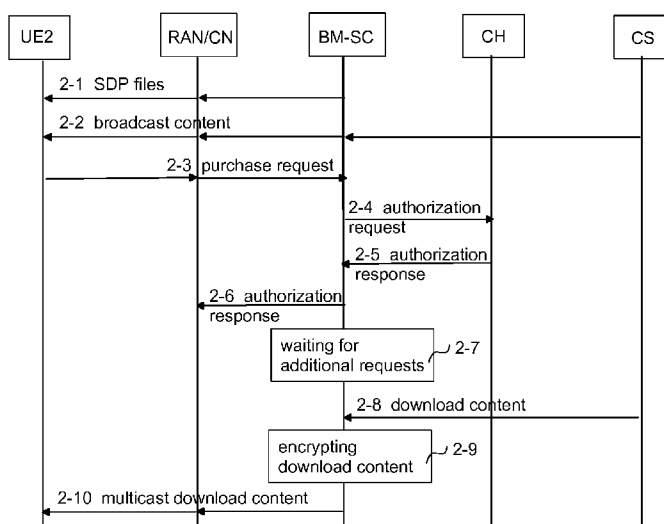


Fig. 2

(57) Abstract: The present solution involves forming an ad hoc subgroup to address a group of requesting user terminals (UE2) interested in a certain service or content. The present solution enables establishing a temporary multicast subgroup based on similar content requests (2-3). In the present solution, a service provider, such as a mobile radio station, gathers content requests transmitted by user terminals (UE2), compares them (2-7), and if enough similarities exist between them, and if their timing is appropriate, an ad hoc multicast subgroup is formed, and the requested content is multicast (2-10) to the members (UE2) of the ad hoc multicast subgroup. After that, the ad hoc multicast subgroup is deleted.

WO 2009/080463 A1

## PROVIDING A DOWNLOAD SERVICE IN COMMUNICATIONS SYSTEM

### FIELD OF THE INVENTION

The invention relates to providing a download service to user terminals in a communications system.

### BACKGROUND OF THE INVENTION

3GPP MBMS (third generation partnership project multimedia broadcast multicast service), 3GPP2 BCMCS (broadcast multicast service), and DVB CBMS/IPDC (digital video broadcasting convergence of broadcast and mobile services/internet protocol datacast) provide an ability to transfer multimedia contents over mobile networks. This is achieved by introducing broadcasting into mobile communications networks. In unicasting, data is transmitted to a single, dedicated receiver. In broadcasting, content is sent out to an unlimited and unknown number of users, as e.g. in terrestrial and satellite based television transmission.

When content is broadcast to a large group of recipients, the system may support immediate interactivity (e.g. voting, betting, ordering) in particular when something is advertised. For example, a user may decide to buy a song s/he is listening to, or request a license for a file that was pushed as a download broadcast to an end device. In these cases, the user needs to connect to an application server, and make a request. The requested content may be free of charge, but it is still necessary to download it, and optionally to protect the content with digital rights management (DRM) on the server side. In the latter case, an additional license may be requested by the end-user device from a rights issuer.

In prior art systems, user terminals receive download data as unicast, even if the requested data is identical between several user terminals ordering at (nearly) the same time, as is often the case in above cases. Unicast refers to a dedicated connection between a delivering application server and the end-user device. Unicast connections are necessary since content requests are handled while being issued, i.e. the content files are delivered immediately.

A disadvantage of the above system is that it is inefficient to send identical content to each requesting party separately. Unicast connections do not scale well and, as a result, are costly in terms of network capacity and

money. Scalability is a concern particularly when large response rates are anticipated or desired, like in mobile marketing scenarios.

Another solution is to broadcast (free or DRM protected) content, have the end-user device store it locally, and, if necessary, acquire the license on demand. For example, in an OMA BCAST solution "activation of prior downloaded broadcast service content" which is protected from unauthorized consumption, the content provider offers digital content within a broadcast service, e.g. the latest top 10 music charts. The user terminal receives the content and stores it. If the end-user wishes to consume the content, or only parts of it, s/he has to purchase rights (a license) for the content. The rights are delivered to the user terminal, enabling consumption of the stored content. If the end-user decides not to consume the content, it may be deleted from the user terminal.

A drawback of the above solution is that the content is broadcast although it may not be of interest to the user. Thus, transmission resources are not used efficiently in the system. In addition, storing content locally on the user device increases memory requirements of the end-user devices, such as mobile devices, especially if multiple services are delivered in this way. For example, if the solution is applied to a mobile marketing scenario, it is undesirable for the users to spend their local storage space for advertising.

Multicasting refers to unidirectional transmission of data from a single sender to multiple, specific receivers. In multicasting, content is sent out to devices that have previously joined a dedicated multicast group. 3GPP MBMS, 3GPP2 BCMCS, DVB-H (DVB-handheld) CBMS, and OMA BCAST (open mobile alliance broadcast), have specified a solution for broadcast/multicast delivery of content. However, in such a case, a multicast group, once formed, stays as a group for a distinct period (e.g. in the case of a pay per time subscription).

## BRIEF DESCRIPTION OF THE INVENTION

An object of the present invention is thus to provide a method, system, and network node for implementing the method so as to solve the above problems. Objects of the invention are achieved by a method and an arrangement which are characterized by what is stated in the independent claims. Preferred embodiments are disclosed in the dependent claims.

The invention is based on an idea of introducing a broadcast/multicast service in a communications system. The invention involves

providing a download service in a communications system, the method comprising broadcasting content to user terminals. During broadcasting, content requests may be received from the user terminals. If a content request received from a first user terminal has at least one common feature with a content request received from a second user terminal, and the content requests are received within a predetermined time period, a multicast subgroup having a multicast address is defined. Common parts of the requested content are multicast to the user terminals included in the multicast subgroup, by utilizing the multicast address.

An advantage of the method and arrangement of the invention is that when content is broadcast/multicast to a large group of recipients the service may support interactivity (e.g. voting, betting, or ordering) immediately without scalability issues e.g. when something is advertised. The invention also enables broadcast/multicast to be used efficiently in order to serve a subgroup of broadcast users requesting the same data within a short time period. A further advantage of the invention is that it enables bandwidth to be saved and efficiency to be increased, since by using multicast a pool of requests can be served at once.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the following the invention will be described in greater detail by means of preferred embodiments with reference to the attached drawings, in which

Figures 1a), 1b), 1c) illustrate a communications system according to an embodiment of the present solution;

Figure 2 illustrates signalling according to an embodiment of the present solution;

Figure 3 illustrates functioning of a network element according to an embodiment of the present solution;

Figure 4 illustrates functioning of a broadcast multicast service centre according to an embodiment of the present solution;

Figure 5 is a graphical representation illustrating multicasting vs. unicasting.

#### DETAILED DESCRIPTION OF THE INVENTION

An OMA BCAST enabler defines an end-to-end framework beyond physical layers for mobile broadcast services. The enabler is bearer-

independent such that it is useful in a diverse and heterogeneous infrastructure. For example, it applies to MBMS, BCMCS, or CBMS bearer technologies. Mobile broadcast services may be built on mobile network systems providing bi-directional connections, and/or on digital broadcast systems providing unidirectional broadcast. Thus the mobile broadcast services enable distribution of rich, interactive, and bandwidth consuming media content to large mobile audiences. An OMA DRM v2.0 enabler does not involve one-to-one rights provisioning for broadcast/multicast. However, in a broadcast environment, service and content protection measures are common business models and thereby necessary. Therefore, several measures have been defined in a subsequently developed OMA BCAST enabler specification, i.e. in the parts "service and content protection" (SPCP) and "broadcast extensions for DRM" (XBS), an extension to DRM v2.0 for broadcast, which allow usage of broadcast rights objects (BCRO). OMA XBS specification, section 10.1, defines a subscriber group as a set of devices that share a group address along with cryptographic key material and algorithms that allow any subset of this group to be associated with a cryptographic key. A subscriber group can be cryptographically secure, which means that it has the additional property that any user device from the group cannot deduce distinct cryptographic keys for subsets that exclude the device. If the subscriber group addressing is cryptographically secure, it can be used effectively to distribute a BCRO to such a subset, where the content encryption keys in BCRO are protected with the distinct key associated with the particular subset. The XBS specification applies to the so-called DRM profile as described in SPCP. Another option for delivering usage rules for multicast/broadcast content is described within SPCP using a smart card profile. This solution uses a smart card as a control mechanism for accessing content.

Digital rights management (DRM) enables distribution of rights for the consumption of digital content in a controlled manner. In particular in broadcast/multicast systems, content distribution is often carried out together with conditional access measures. A DRM system defines fine-grained rules for the consumption of content after reception. The content is distributed and consumed on authenticated devices, based on user rights expressed by the content providers. Typically, the content is encrypted with an encryption key, and can only be decrypted by a user device that has gained sufficient rights to consume the content.

DRM content format (DCF) is used to package and protect discrete media (that is, ring tones, applications, images, etc). This discrete media profile allows wrapping of content in an envelope (DCF). That content may or may not be encrypted and then placed as a single content object in the DCF's internal structure and layout. Packetized DRM content format (PDCF) is used to protect continuous media (for example, audio and video). Continuous media is protected in a separate profile because it is packetized, and thus the profile is called the packetized DCF (PDCF). Applications that read and parse continuous media are meant to work on the file on a packet-by-packet basis. To facilitate the playback of protected continuous media, the storage format is structured in such a way that the packets are individually protected. This structurally aware packetization is also required in order to stream continuous media. An OMA DRM-compliant streaming server should be able to understand the content format's structure in order to break the content into headers and packets that can be delivered to a client that understands the content format.

The present solution involves forming an ad hoc subgroup to address a group of requesting user terminals interested in a certain service or content. The present solution enables establishment of a temporary multicast subgroup based on similar content requests. In the present solution, a service provider, such as a mobile radio station, gathers content requests (also referred to as service requests and/or purchase requests) transmitted by user terminals, compares them, and if enough similarities exist between them, and if their timing is appropriate (i.e. close to one another; received within a specific pooling period), an ad hoc multicast subgroup is formed, and the requested content is multicast to the members of the ad hoc multicast subgroup. After that, the ad hoc subgroup is deleted (information on the ad hoc subgroup may be stored e.g. for charging purposes).

In the following, embodiments of the present solution will be described with reference to a cellular or wireless communications system, such as a third generation (or beyond 3G) mobile communications system or WLAN (wireless local area network). However, the solution is not meant to be restricted to these embodiments. The present solution is applicable to any network node, corresponding component(s), and/or to any communication system or any combination of different communication systems capable of providing user terminals with a broadcast/multicast service. The communication system may be a fixed communication system or a wireless communication system or

a communication system utilizing both fixed networks and wireless networks. The protocols used, the specifications of communication systems and network nodes, especially in mobile and wireless communication, develop rapidly. Such development may require extra changes to an embodiment. Therefore, all words and expressions should be interpreted broadly and they are intended to illustrate, not to restrict, the embodiment. The relevant inventive aspect is the functionality concerned, not the network element or equipment where it is executed.

Figures 1a), 1b), 1c) illustrate a communications system S according to an embodiment of the present solution. The system S comprises at least one user terminal UE1, UE2, UE3 that may be e.g. a mobile or wireless terminal, such as a mobile phone (mobile station), a personal digital assistant (PDA), a game console, a laptop or the like, capable of operating in a broadcast/multicast network environment, such as a mobile broadcast radio network. The system S further comprises a radio access network RAN, such as a radio access network of a cellular network, or a wireless local area network (WLAN). The system S also comprises a core network CN, such as a core network of a cellular network. The access network RAN and the core network are operated by a network operator, for providing network access to the user terminals UE1, UE2, UE3. The system S further includes a broadcast multicast service centre BM-SC operated by a service operator. The broadcast multicast service centre BM-SC may be connected to a content source CS, and to a charging solution CH. The user terminals UE1, UE2, UE3 are able to communicate with the broadcast multicast service centre BM-SC, via the core network CN (including e.g. a mobile switching centre) and the radio access network RAN (including e.g. a base station and/or a radio network controller), when the user terminal UE1, UE2, UE3 is in an area of the radio access network RAN. Figures 1a), 1b), 1c) show a simplified version of a mobile broadcasting network structure, which only illustrate the components necessary for illustrating the present solution, even though those skilled in the art naturally know that a general communications system also comprises other functions and structures, which do not have to be described in more detail herein. The network nodes broadcast multicast service centre BM-SC, content source CS, and/or charging solution CH may include any network element operated by a service operator in a broadcast/multicast network, such as an IP multimedia subsystem (IMS, e.g. a home subscriber server (HSS) for service authentication), operations/business sup-

port systems (OSS/BSS), a streaming server, or a database. Although each network node or function RAN, CN, BM-SC, CH, CS has been depicted as one entity, different modules and memory may be implemented in one or more physical or logical entities.

5           In the suggested implementation of multicast content delivery with a pooling concept shown in Figures 1a), 1b), 1c), content requests are pooled and the requested content is encrypted (if applicable, e.g. if the content is not free, should not be retransmitted by users, or has other restrictions), and then transmitted as multicast. As shown in Figure 1a), user terminals UE1, UE2,  
10   UE3 (and eventual other users not represented in the figure) are able to receive a broadcast signal (i.e. a broadcast stream). During the broadcast, e.g. users of UE2 and UE3 may fancy a certain song and request to download it, as illustrated in Figure 1b). Thus, UE2 and UE3 are able to form an ad hoc group that – after a pooling period – may receive download content as multicast, as  
15   illustrated in Figure 1c).

          In the graphical representation shown in Figures 1a), 1b), 1c), it is assumed that subscribers request the same content nearly at the same time, i.e. within the pooling period. In the example, a mobile radio service (such as a broadcast multicast service centre BM-SC) delivers a continuous audio stream  
20   as a broadcast to the user devices UE1, UE2, UE3. The user terminals UE1, UE2, UE3 have an option to purchase a currently playing song at any time by transmitting a content request to the network. In the situation shown in Figure 1b), only user terminals UE2 and UE3 request the content, but also other user terminals receiving the broadcast stream may request the content although not  
25   shown in Figure 1b). According to the present solution, based on content requests collected during the pooling period, an ad hoc multicast group can be formed for providing the requested service to the requesting user terminals UE2, UE3. To pool the purchase requests, delivery of a corresponding music file as a download may be delayed until the current song (or other program  
30   item) has finished playing, with an eventual additional delay of approximately 30 seconds, for example. After the pooling period, the music file – which may or may not be DRM protected – is delivered as a multicast only to the requesting user terminals, i.e. in this case UE2 and UE3, but not UE1, as shown in Figure 1c). If an OMA BCAST DRM profile is applied, an OMA XBS extension  
35   defines the use of broadcast rights objects (BCRO) to deliver required licenses within the multicast. Or, in case of using the OMA BCAST smartcard profile

(i.e. SC profile, another way of key management and licence delivery in OMA BCAST), a license is delivered as part of a security policy extension, which is part of the STKM/LTKM delivery in OMA BCAST. LTKM (long term key message) includes key information stored on the smart card, and it is necessary for processing of STKM (short term key message). Although not illustrated in Figure 1b), the user terminals UE2 and/or UE3 are not necessarily able to receive the broadcast stream during the time period the requested content is multicast to UE2, UE3 (but UE1 is able to receive the broadcast stream during that time period).

Figure 2 illustrates signalling between network entities according to an embodiment of the present solution, by using a multimedia broadcast multicast service (MBMS) as an example. Broadcast streaming content 2-2, and corresponding metadata for streaming and download content in one or more session description protocol (SDP) file(s) 2-1, are transmitted to the user terminal UE2 (for clarity reasons, only one user terminal is shown in Figure 2, but in reality there may be more than one user terminal receiving the content). The SDP files are transmitted 2-1 e.g. by a broadcast multicast service centre BM-SC, via a core network CN and a radio access network RAN. The broadcast streaming content is transmitted 2-2 e.g. by a content source CS, via the broadcast multicast service centre BM-SC, core network CN, and radio access network RAN. Prior art signalling may be utilized in the messages 2-1 and 2-2.

A purchase may be implemented by joining an MBMS multicast group, wherein the user terminal UE2 sends an internet group management protocol (IGMP) join message (also referred to as a purchase request and/or content request) to the broadcast multicast service centre BM-SC, via the radio access network RAN and the core network CN. (The join message 2-3 indicates a multicast group IP address. An application layer/interactivity protocol determines the correct IP address, e.g. picks a right SDP file at a right time during the stream). After that BM-SC transmits an authorization request message 2-4 to a charging solution CH, in order to get the user terminal UE2 authorized for the network CN/RAN. Data necessary for the IGMP join procedure was communicated to the user terminal UE2 by means of the session description protocol (SDP) file of the message 2-1. The user terminal authorization may also be utilized when generating a charging record for the song purchase. If the backend charging solution CH indicates that the user terminal UE2 is able to cover the purchase (e.g. has sufficient funds), or the content is free, the

join request is granted, by transmitting an authorization granted response 2-5, 2-6 via BM-SC to the network CN/RAN, and the user terminal UE2 can be placed into a multicast group. Otherwise, the join request is denied and the user terminal UE2 cannot be placed into the multicast group (wherein an authorization denied response may be transmitted 2-5, 2-6 via BM-SC to the network CN/RAN).

In step 2-7, BM-SC is arranged to wait for eventual additional content requests from other user terminals UE1, UE3, directed to a similar content. In the message 2-8, the purchased download content is delivered, by the content source CS, to BM-SC. After a pooling delay has expired, the purchased download content is delivered 2-10 by BM-SC, via the network CN, RAN, as a file delivery over unidirectional transport (FLUTE) download to the user terminals that have successfully joined the multicast group. In step 2-9, BM-SC creates a multicast group on the basis of the multicast group IP address (i.e. multicast address), and may or may not encrypt the download content, before transmitting it towards the user terminal UE2 (and to other user terminals UE3 requesting the same content within the pooling period, although not shown in Figure 2). After the requested content has been provided to the user terminals the multicast address and/or the multicast group may be deleted. Another option is that the multicast address is stored in the network (e.g. in BM-SC).

Figure 3 illustrates functioning of a radio access network RAN/core network CN according to an embodiment of the present solution. Broadcast streaming content, and corresponding metadata in a session description protocol (SDP) file, transmitted by BM-SC, are forwarded in steps 3-1, 3-2 to the user terminals UE1, UE2, UE3. An internet group management protocol (IGMP) join message (i.e. a purchase request), transmitted by the user terminal UE2, UE3, is forwarded in step 3-3 to the broadcast multicast service centre BM-SC. After that an authorization response is received 3-4 from BM-SC. If the user terminal UE2, UE3 is able to cover the purchase (e.g. has sufficient funds), or the content is free, the join request is granted, an authorization granted response is received 3-4 from BM-SC, and the user terminal UE2, UE3 can be placed into the corresponding multicast group. In step 3-5, the purchased download content is received from BM-SC, as a file delivery over unidirectional transport (FLUTE) download, and forwarded 3-5 to the user terminals UE2, UE3 that have successfully joined the multicast group. However, if the join request is denied, the user terminal is not placed in the multicast

group, and an authorization denied response may be received 3-4 from BM-SC, in which case the user terminal in question is not provided with the multicast download content.

Figure 4 illustrates functioning of a broadcast multicast service centre BM-SC according to an embodiment of the present solution, by using a multimedia broadcast multicast service (MBMS) as an example. In step 4-1, metadata in a session description protocol (SDP) file, related to broadcast streaming content, is transmitted via a core network CN/radio access network RAN to user terminals UE1, UE2, UE3. In step 4-2, the broadcast streaming content is received from a content source and forwarded via the core network CN/radio access network RAN to UE1, UE2, UE3. Prior art procedures may be utilized in steps 4-1 and 4-2. In step 4-3, an Internet group management protocol (IGMP) join message, (i.e. a purchase request), is received from UE2 via the access network RAN/core network CN. After that, in step 4-4, BM-SC transmits an authorization request message to a charging solution CH in order to authorize the user terminal UE2 for the network CN, RAN. Data necessary for the IGMP join procedure is communicated to the user terminal UE2 by means of the session description protocol (SDP) file in step 4-1. If the backend charging solution CH indicates that the user terminal UE2 is able to cover the purchase (e.g. has sufficient funds), or the content is free, an authorization granted response 4-5 is received in BM-SC from CH. This means that the join request is granted and the user terminal UE2 can be placed into a multicast group. Otherwise, the join request is denied and the user terminal UE2 cannot be placed the multicast group (an authorization denied response may be received 4-5 in BM-SC from CH). In step 4-6, the authorization granted response is transmitted to CN/RAN. In step 4-7, BM-SC waits for eventual additional requests originating from other user terminals UE1, UE3. In step 4-8, the purchased download content is received from the content source CS. After a pooling delay has expired, the purchased download content is delivered 4-10 by BM-SC, via the network CN, RAN, as a file delivery over unidirectional transport (FLUTE) download to the user terminals UE2, UE3 that have successfully joined the multicast group. In step 4-9, BM-SC defines a multicast address for the multicast group and may or may not encrypt the download content, before transmitting it towards the user terminal UE2, UE3.

Figure 5 shows a graphical representation illustrating unicast vs. multicast, depicting the problem of scalability and illustrating capacity savings

that can be achieved when content is multicast (lower half) instead of unicast (upper half). In the latter case, a dedicated connection is necessary for each receiving user terminal UE such that bandwidth requirements, especially for popular content, are increased. In contrast, multicast files can be delivered efficiently via core network elements NE and base stations BS to user terminals UE that have previously requested the content. As can be seen in Figure 5, no dedicated transmission is necessary in the network for each user terminal receiving the multicast content. In multicast, the provision of the content file to different user terminals can be handled as one unit, while in unicast the provided content file has to be handled separately (a dedicated transmission channel necessary in the network) for each user terminal UE.

While a radio service is used as an example, it should also be noted that any other live streaming service may serve the same purpose, e.g. a television program where the users may purchase ring tones. The streaming service facilitates channeling purchase orders in a relatively short timeframe, as the offer or purchasing impulse is tied to continuous media delivery. Orders received from outside the pooling period may still be delivered as unicast.

Required decryption keys for the protected content may be transmitted to the user terminal a) as multicast, by using the pooling mechanism described above, b) as unicast, by applying a domain key concept of OMA DRM 2.0, included in the data transmission, c) by using an OMA BCAST service and content protection functionality with BCRO (DRM profile), and/or d) OMA BCAST with smart card profile.

An advantage of the pooling of the content requests before delivering the content lies in leveraging the economies of scale. Instead of several unicast connections, only one multicast connection is required, thus reducing the costs of a file delivery.

In the case of free download content, such as advertising content, the total costs of a marketing campaign may be lowered by means of the present solution. If, on the other hand, the content is charged for, the margin of each sale is increasing. For a network operator, the available network capacity increases, thus allowing delivery of other services.

Another advantage of the present solution, especially in mobile marketing (i.e. mobile advertising), is an opportunity to divide users into target groups. Many users are not willing to accept mobile advertising which is not, at least to a certain degree, personalized. Fully personalized advertising deliv-

ered as unicast incurs high costs. By means of the multicast groups according to the present solution, advertising costs can be reduced while some adaptation to the user's situation and profile may still be achieved. Multicast groups according to the present solution may be created, for example, based on user age, regional location, income, and/or gender. Thus, during the pooling period the requesting user may be placed into the most suitable group, according to a predefined rule set. If applicable, a user may also belong to more than one multicast group, thus receiving more than one download file.

The present solution enables purchase commands to be issued at different times but the download to occur simultaneously as a multicast.

The present solution may be applied, for example, to mobile advertising. The present solution may increase the efficiency of future advertising-related products. The present solution may also be applied to a mobile broadcast solution which functions as a central content controlling entity in 3G and DVB-H mobile networks. Other possibilities include communications service products that deliver download files with DRM, such as a download/delivery platform (download/deliver server) for music, ring tones, etc.

It should be noted that in connection with the present solution, the term "download(ing)" is used to refer to a group of terminals forming a subgroup and the network multicasting the content based on the terminal-triggered requests. So, the present solution differs from conventional download services. The present solution involves a broadcast/multicast method the efficiency of which comes from multicasting instead of a point-to-point connection that would be typical for conventional download. The multicast is triggered by a terminal requesting a "download" feature, and the service sends it to many terminals at once and becomes therefore an efficient scenario.

Although the present solution has been described above with reference to mobile broadcast radio, such as mobile Internet radio, it should be noted that the present solution may be used in a similar way for providing any other content service, such as mobile television or online gaming. Although the present solution has been described above assuming that radio program is broadcast to the user terminals as a broadcast stream, and that the requested content is then multicast to the requesting user terminals as a downloadable file, the content may be provided by using any suitable broadcast/multicast technique. In this context, the term content or content service may refer to music, audio, video, data, speech and/or any other type of content that can be

broadcast/multicast in the system. The content may or may not be protected content (e.g. DRM protected).

The items and steps shown in the figures are simplified and only aim at describing the idea of the present solution. The steps/points, signaling messages and related functions described above in Figures 1 to 5 are in no absolute chronological order, and some of the steps/points may be performed simultaneously or in an order different from the given one. Other functions may also be executed between the steps/points or within the steps/points and other signaling messages sent between the illustrated messages. Some of the steps/points or part of the steps/points can also be left out or integrated together or replaced by a corresponding step/point or part of the step/point. The apparatus operations illustrate a procedure that may be implemented in one or more physical or logical entities. The signaling messages are only exemplary and may even comprise several separate messages for transmitting the same information. The messages serve only as examples and they may contain only some of the information mentioned above. In addition, the messages may also contain other information, and the titles may deviate from those given above. Instead of or in addition to a broadcast multicast service centre, content source node, charging solution node, core network, radio access network, and/or user terminal, the above-described operations may be performed in any other element of a communications system.

In addition to prior art means, a system or system network nodes that implement the functionality of the present solution comprise means for establishing an ad hoc multicast group in a manner described above. Existing network nodes and user terminals comprise processors and memory that may be utilized in the operations of the present solution. Any changes necessary in implementing the present solution may be carried out using supplements or updates of software routines and/or routines included in application-specific integrated circuits (ASIC) and/or programmable circuits, such as EPLDs (electrically programmable logic device) or FPGAs (field programmable gate array).

It will be obvious to a person skilled in the art that as technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

## LIST OF ABBREVIATIONS

|    |       |                                                        |
|----|-------|--------------------------------------------------------|
|    | 3GPP  | Third generation partnership project                   |
|    | IP    | Internet protocol                                      |
|    | BM-SC | Broadcast multicast service center                     |
| 5  | DCF   | Digital rights management content format               |
|    | PDCF  | Packetized DCF                                         |
|    | DRM   | Digital rights management                              |
|    | FLUTE | File delivery over unidirectional transport (RFC 3926) |
|    | IPDC  | IP datacast                                            |
| 10 | MBMS  | Multimedia broadcast multicast service                 |
|    | BCMCS | Broadcast multicast service                            |
|    | CBMS  | Convergence of broadcast and mobile services           |
|    | DVB-H | Digital video broadcasting - handheld                  |
|    | OMA   | Open mobile alliance                                   |
| 15 | RO    | Rights object                                          |
|    | BCRO  | Broadcast rights object                                |
|    | SGK   | Subscriber group key                                   |
|    | SDP   | Session description protocol                           |
|    | IGMP  | Internet group management protocol                     |
| 20 |       |                                                        |

## CLAIMS

1. A method of providing a download service in a communications system (S), the method comprising broadcasting (2-2) content that can be received by user terminals (UE1, UE2, UE3) in the system (S), **character-**  
5 **ized** by the method further comprising  
receiving a first content request (2-3) from a first user terminal (UE2) and a second content request from a second user terminal (UE3),  
wherein, if the first content request (2-3) has at least one common feature with the second content request, and if the first content request and the  
10 second content request are received within a predetermined time period, the method comprises  
defining (2-9) a multicast subgroup having a multicast address, wherein the multicast subgroup includes the first and the second user terminal (UE2, UE3); and  
15 transmitting (2-10) common parts of the requested content to the multicast subgroup by utilizing the multicast address.
2. A method according to claim 1, **characterized** by  
performing, as a response to receiving a content request (2-3), an authorization check on the user terminal; and  
20 including the user terminal in the multicast subgroup, if the user terminal is authorized to receive the requested content.
3. A method according to claim 1 or 2, **characterized** by  
forming a temporary multicast subgroup of user terminals from which content requests directed to similar content are received within a pooling  
25 period; and  
deleting the temporary multicast subgroup after the related content has been provided to the user terminals.
4. A method according to claim 1, 2 or 3, **characterized** in that the multicast address is deleted after the related content has been pro-  
30 vided to the user terminals.
5. A method as claimed in any one of the preceding claims, **characterized** by providing a service for downloading at least one of an audio file, music file, video file, data file, speech file, audio stream, music stream, video stream, data stream, speech stream, and protected content to  
35 the user terminal.

6. A method as claimed in any one of the preceding claims, **characterized** in that information on the multicast subgroup is stored for charging purposes.

7. A method as claimed in any one of the preceding claims, **characterized** by delaying transmission of the requested content until broadcasting of a current song or item is finished and/or until a pooling period is expired.

8. A communications system (S) configured to broadcast content that can be received by user terminals (UE1, UE2, UE3) in the system (S), **characterized** in that the system (S) is further configured to

receive a first content request from a first user terminal (UE2) and a second content request from a second user terminal (UE3),

wherein, if the first content request has at least one common feature with the second content request, and if the first and the second content request are received within a predetermined time period, the system is configured to

define a multicast subgroup having a multicast address, wherein the multicast subgroup includes the first and the second user terminal (UE2, UE3); and

transmit common parts of the requested content to the multicast subgroup by utilizing the multicast address.

9. A system according to claim 8, **characterized** in that the system (S) is configured to

perform, as a response to receiving a content request, an authorization check on the user terminal (UE2, UE3); and

include the user terminal in the multicast subgroup, if the user terminal (UE2, UE3) is authorized to receive the requested content.

10. A system according to claim 8 or 9, **characterized** in that the system (S) is configured to

form a temporary multicast subgroup of user terminals (UE2, UE3) from which content requests directed to similar content are received within a pooling period; and

delete the temporary multicast subgroup after the related content has been provided to the user terminals (UE2, UE3).

11. A system according to claim 8, 9, or 10, **characterized** in that the system (S) is configured to delete the multicast address after the related content has been provided to the user terminals.

12. A system as claimed in any one of the preceding claims, **characterized** in that the system (S) is configured to provide a service for downloading at least one of an audio file, music file, video file, data file, speech file, audio stream, music stream, video stream, data stream, speech stream, and protected content to the user terminal.

13. A system as claimed in any one of the preceding claims, **characterized** in that the system (S) is configured to store information on the multicast subgroup for charging purposes.

14. A system as claimed in any one of the preceding claims, **characterized** in that the system (S) is configured to delay transmission of the requested content until broadcasting of a current song or item is finished and/or until a pooling period is expired.

15. A content provider node (BM-SC) in a communications system (S), wherein the content provider node (BM-SC) is configured to broadcast content that can be received by user terminals (UE1, UE2, UE3) in the system (S), **characterized** in that the content provider node (BM-SC) is further configured to

receive a first content request from a first user terminal (UE2) and a second content request from a second user terminal (UE3),

wherein, if the first content request has at least one common feature with the second content request, and if the first and the second content request are received within a predetermined time period, the content provider node (BM-SC) is configured to

define a multicast subgroup having a multicast address, wherein the multicast subgroup includes the first and the second user terminal (UE2, UE3); and

transmit common parts of the requested content to the multicast subgroup by utilizing the multicast address.

16. A content provider node (BM-SC) according to claim 15, **characterized** in that it is configured to

perform, as a response to receiving a content request, an authorization check on the user terminal (UE2, UE3); and

include the user terminal in the multicast subgroup, if the user terminal (UE2, UE3) is authorized to receive the requested content.

17. A content provider node (BM-SC) according to claim 15 or 16, **characterized** in that it is configured to

5 form a temporary multicast subgroup of user terminals (UE2, UE3) from which content requests directed to similar content are received within a pooling period; and

delete the temporary multicast subgroup after the related content has been provided to the user terminals (UE2, UE3).

10 18. A content provider node (BM-SC) according to claim 15, 16 or 17, **characterized** in that it is configured to delete the multicast address after the related content has been provided to the user terminals.

19. A content provider node (BM-SC) according to claim 15, 16 or 17, **characterized** in that it is configured to store the multicast address.

15 20. A content provider node (BM-SC) as claimed in any one of the preceding claims 15 to 19, **characterized** in that it is configured to provide a service for downloading at least one of an audio file, music file, video file, data file, speech file, audio stream, music stream, video stream, data stream, and speech stream to the user terminal.

20 21. A content provider node (BM-SC) as claimed in any one of the preceding claims 15 to 20, **characterized** in that the system (S) is configured to store information on the multicast subgroup for charging purposes.

22. A content provider node (BM-SC) as claimed in any one of the preceding claims 15 to 21, **characterized** in that it is configured to delay transmission of the requested content until broadcasting of a current song or item is finished.

25 23. A content provider node (BM-SC) as claimed in any one of the preceding claims 15 to 21, **characterized** in that it is a broadcast multicast service centre.

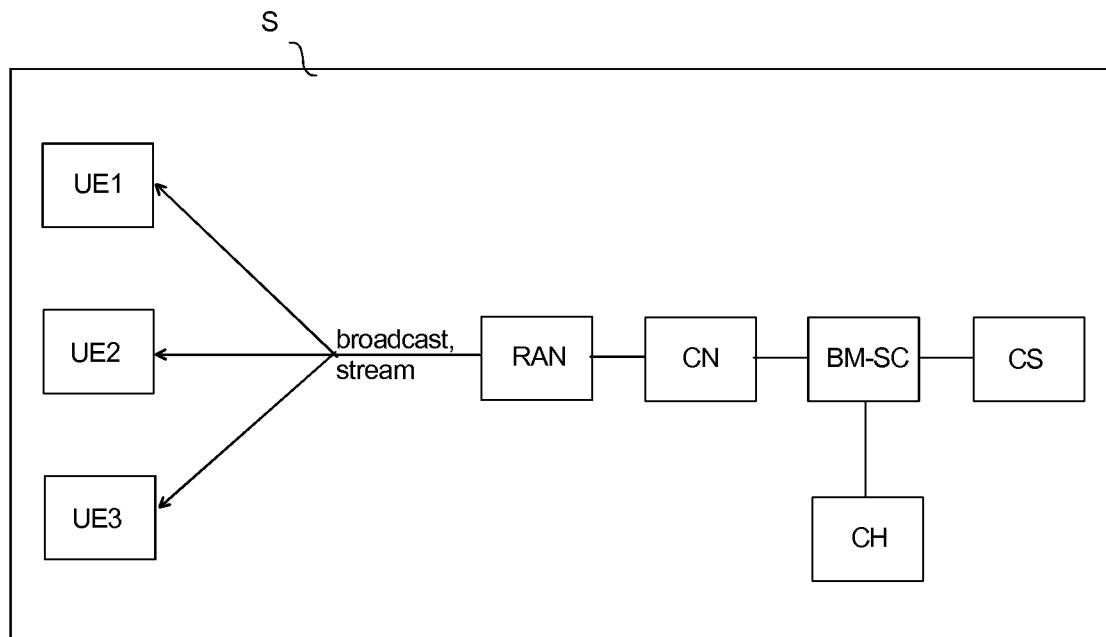


Fig. 1a)

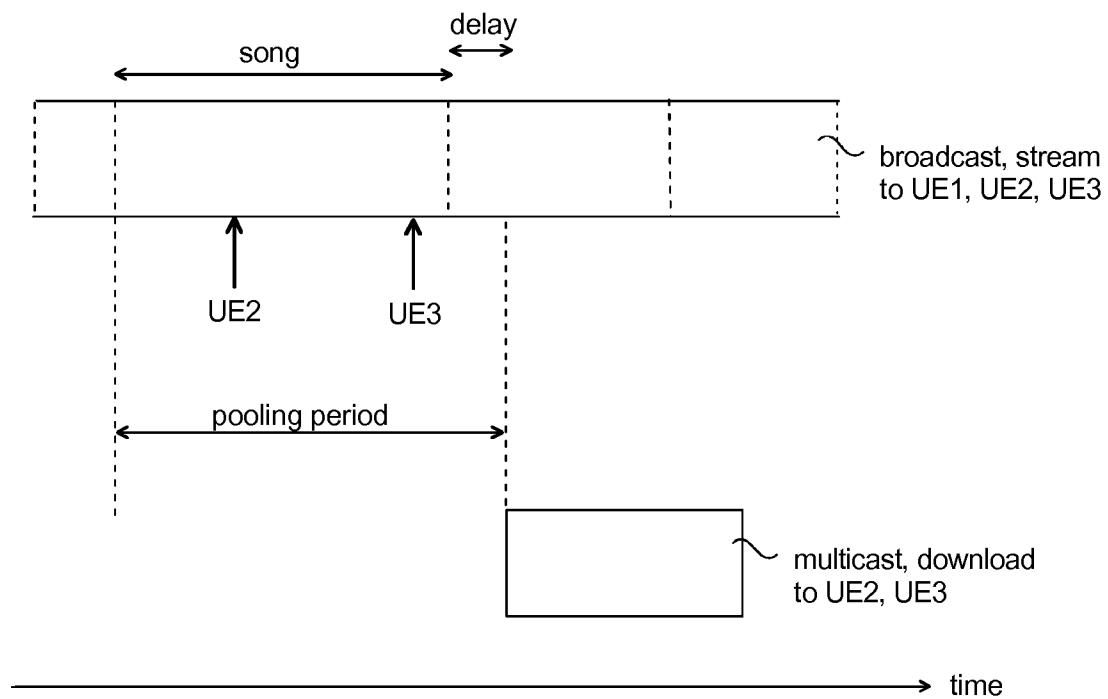


Fig. 1b)

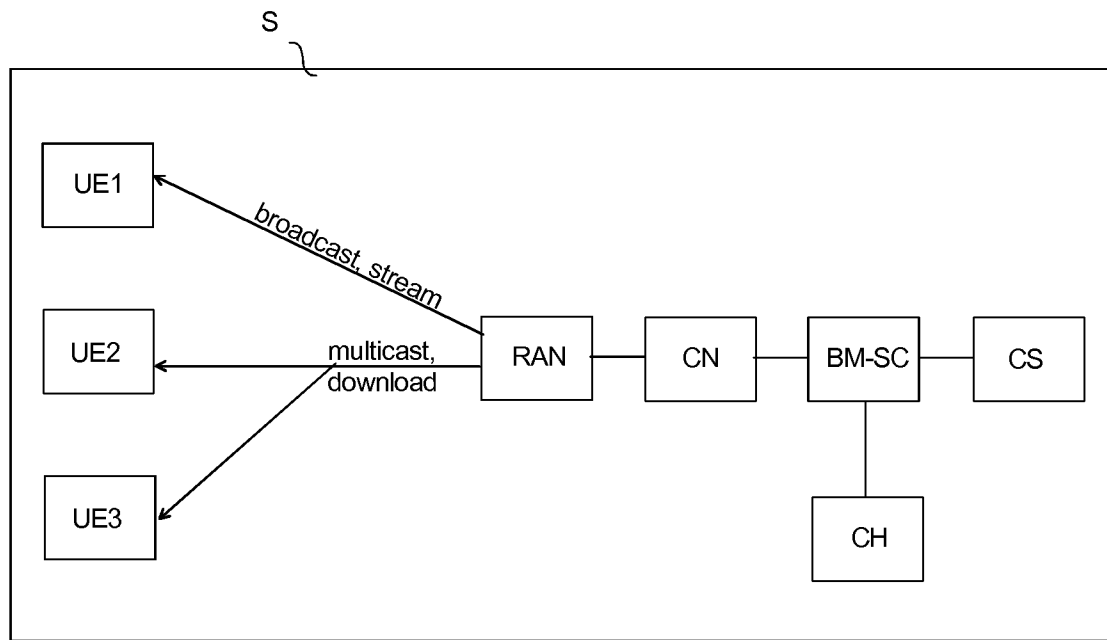


Fig. 1c)

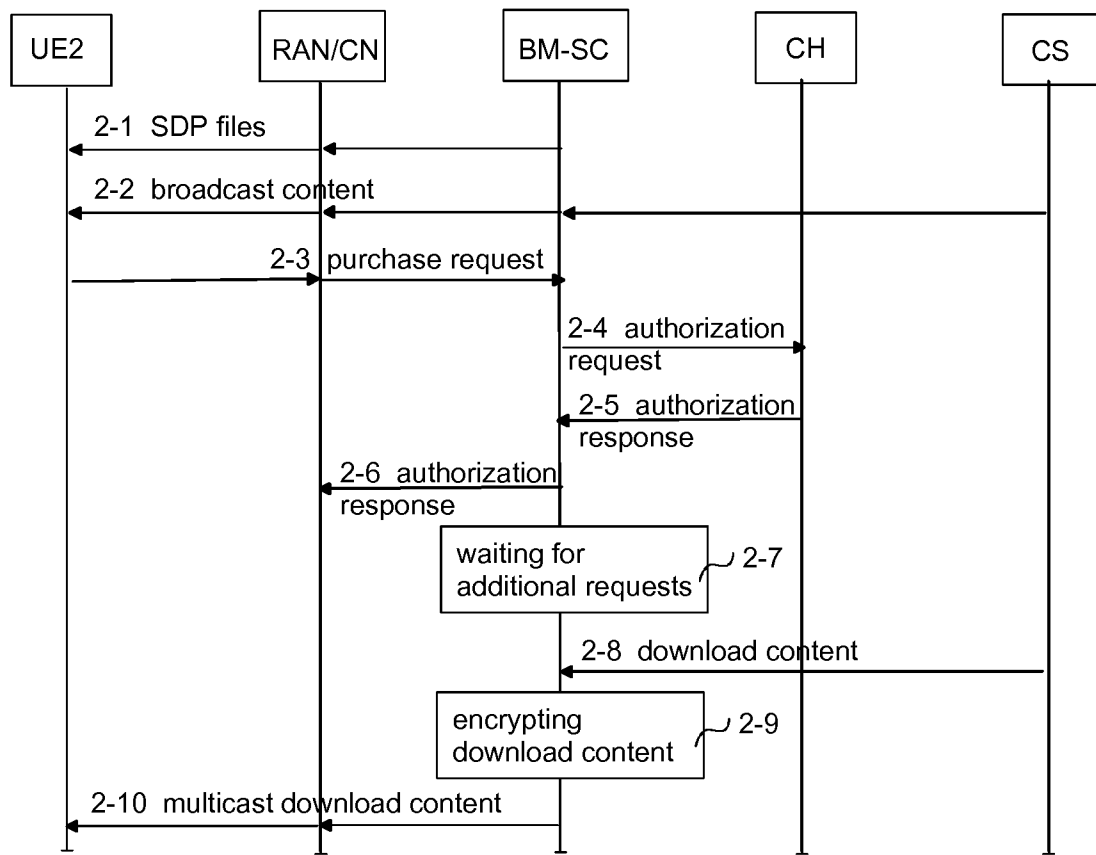
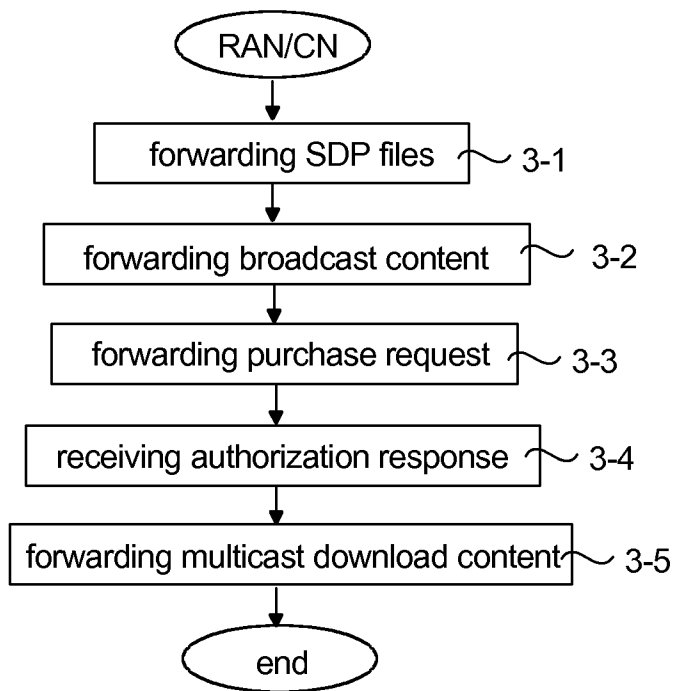
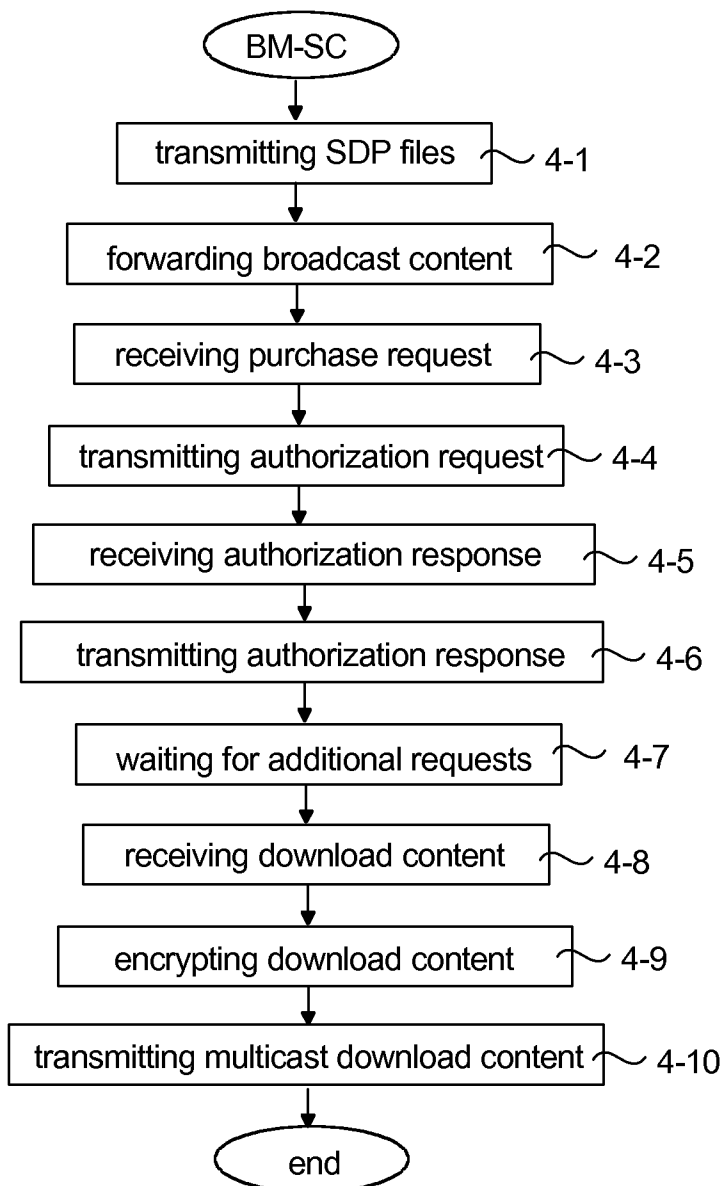


Fig. 2

*Fig. 3*

*Fig. 4*

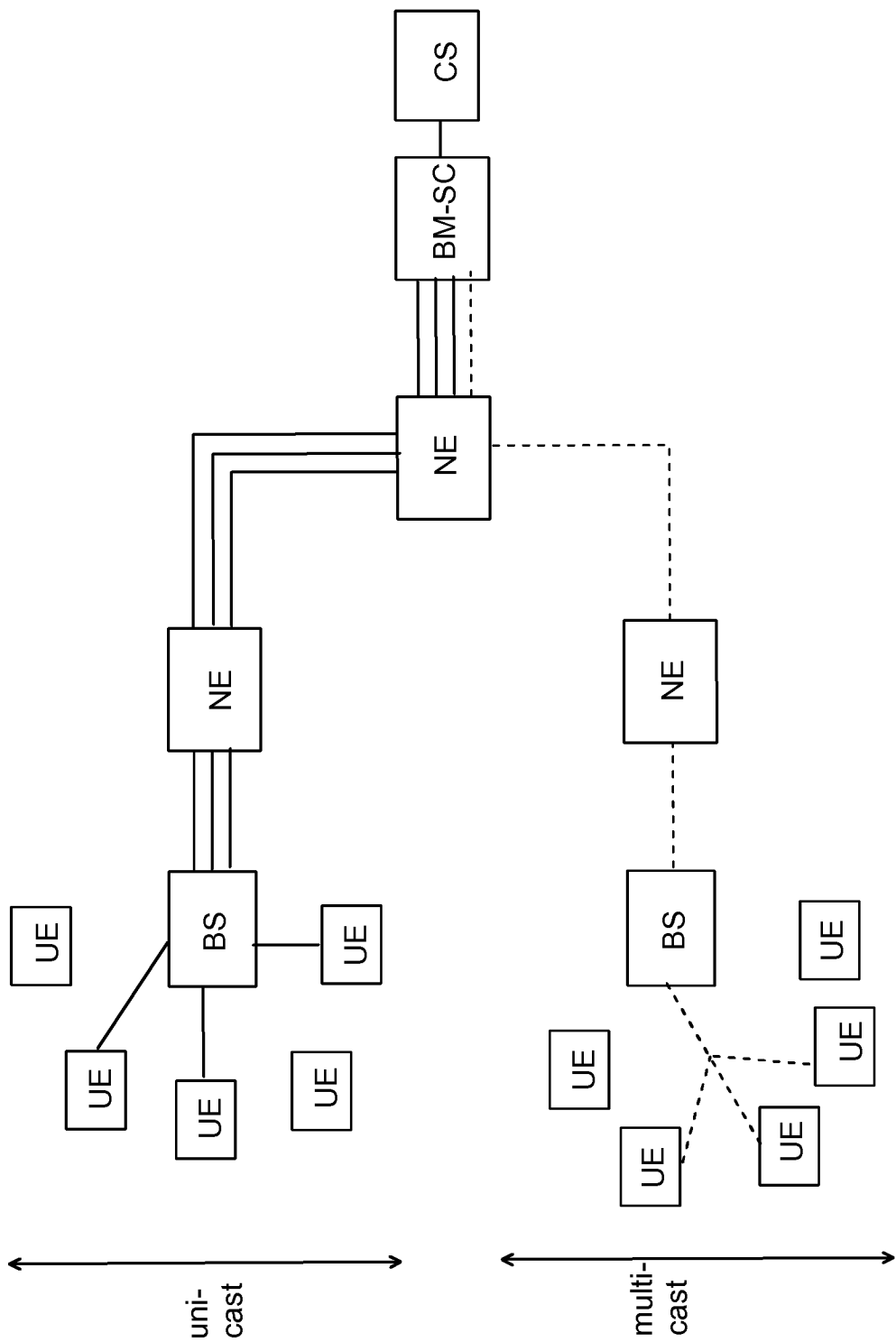


Fig. 5

## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/066835

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. H04L29/06 H04L12/18

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Relevant to claim No. |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | <p>LEE J Y B ET AL: "DESIGN, PERFORMANCE ANALYSIS, AND IMPLEMENTATION OF A SUPER-SCALAR VIDEO-ON-DEMAND SYSTEM" IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 12, no. 11, November 2002 (2002-11), pages 983-997, XP001133429<br/>           ISSN: 1051-8215<br/>           page 983, paragraph I.<br/>           page 984, left-hand column, last paragraph<br/>           page 985, left-hand column, paragraph 5<br/>           page 985, right-hand column, line 11 - line 13<br/>           paragraph [III.]<br/>           paragraph [III.A.] - paragraph [III.C.]<br/>           figures 6,7<br/>           page 991, line 14 - line 16<br/>           page 991, line 24 - line 26</p> <p style="text-align: center;">-/--</p> | 1-23                  |

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

## \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

12 March 2009

Date of mailing of the international search report

19/03/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040,  
 Fax: (+31-70) 340-3016

Authorized officer

Martinozzi, A

## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/066835

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                 | Relevant to claim No. |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | -----<br>US 2007/005771 A1 (COLLET JEAN-LUC [FR] ET AL) 4 January 2007 (2007-01-04)<br>abstract<br>paragraph [0006]<br>paragraph [0010] - paragraph [0012]<br>paragraph [0061]<br>paragraph [0064] - paragraph [0067]<br>paragraph [0075]<br>----- | 1-23                  |
| X         | -----<br>US 2007/147411 A1 (BIJWAARD DENNIS [NL] ET AL) 28 June 2007 (2007-06-28)<br>abstract<br>paragraph [0002] - paragraph [0004]<br>paragraph [0013]<br>-----                                                                                  | 1-23                  |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2008/066835

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 2007005771 A1                          | 04-01-2007          | NONE                       |                     |
| US 2007147411 A1                          | 28-06-2007          | CN 101346929 A             | 14-01-2009          |
|                                           |                     | EP 1964315 A2              | 03-09-2008          |
|                                           |                     | KR 20080085841 A           | 24-09-2008          |
|                                           |                     | WO 2007075398 A2           | 05-07-2007          |