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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
60/608,110	09/09/2004	Ojas Thakor Choksi	100773.55338PV

CONFIRMATION NO. 9784

23911
CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P.O. BOX 14300
WASHINGTON, DC 20044-4300



OC000000019493557

Date Mailed: 07/05/2006

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/16/2006.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

SHARON KUANG
PTOSS (703) 305-3006

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60/608,110	09/09/2004	Qjas Thakor Choksi	100773.55338PV

57541
 SPRINT NEXTEL CORPORATION
 6391 SPRINT PARKWAY
 MAILSTOP: KSOPHT0101-Z2100
 OVERLAND PARK, KS 66251-2100

CONFIRMATION NO. 9784



OC000000019493580

Date Mailed: 07/05/2006

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/16/2006.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

SHARON KUANG
 PTOSS (703) 305-3006

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JPW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. Nos:

60/608,110

**REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY AND STATEMENT
UNDER 37 CFR 3.73(b)**

Filed herewith is a Revocation of Power of Attorney that is signed by one authorized to act on behalf of the assignee of the entire interest of the applicant (per 37 C.F.R. § 1.32(b)(4)).

Revocation of Power of Attorney with New Power of Attorney.

All previous powers of attorney given in the above-identified applications (a printed chart is attached and computer disk is enclosed) are hereby revoked, and hereby appointed are the practitioners associated with Customer Number 57541 to prosecute these Applications and transact business in the Patent and Trademark Office connected therewith. Please send all correspondence to the address associated with the same customer number.

Statement under 37 CFR 3.73(b)

Sprint Nextel Corporation. is the assignee of the entire right, title and interest of the Applications, captioned above. The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Respectfully Submitted,



Harley Ball, Vice President
Sprint Nextel Corporation

6/12/06

Date

13281 U.S. PTO

PTO/SB/16 (08-03)

Approved for use through 07/31/2006. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

INVENTOR(S)					
Given Name (first and middle [if any])		Family Name or Surname		Residence (City and either State or Foreign Country)	
Ojas Thakor		CHOKSI		Herndon, VA	
☐ Additional inventors are being named on the <u>separately numbered sheets attached hereto</u>					
TITLE OF THE INVENTION (500 characters max)					
Architecture Options for Signaling and Media Inter-Working					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
☒ Customer Number		23911			
OR					
☐ Firm or Individual Name		Crowell & Moring LLP			
Address		Intellectual Property Group			
Address		PO Box 14300			
City		State		Zip	20044-4300
Country		Telephone		Fax	202-628-8844
ENCLOSED APPLICATION PARTS (check all that apply)					
☒ Specification		Number of Pages		16	
☒ Drawing(s)		Number of Sheets		19	
☒ Application Data Sheet.		See 37 CFR 1.76			
☐ CD(s),		Number _____			
☐ Other (specify)		_____			
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
☐ Applicant claims small entity status. See 37 CFR 1.27.					
☒ A check or money order is enclosed to cover the filing fees					
☒ The Commissioner is hereby authorized to charge any deficiencies or credit any overpayment to Deposit Account Number: <u>05-1323</u> (Docket # 100773.55338PV).					
☐ Payment by credit card. Form PTO-2038 is attached.					
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
☒ No					
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____					

Respectfully submitted,

[Page 1 of 1]

Date September 9, 2004

SIGNATURE

REGISTRATION NO. 43,420
(if appropriate)

Docket Number: 100773.55338PV

TYPED or PRINTED NAME Stephen W. Palan

TELEPHONE 202-624-2710

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Provisional Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

**ARCHITECTURE OPTIONS FOR SIGNALING
AND MEDIA INTER-WORKING**

BACKGROUND OF THE INVENTION

[0001] Cellular communications systems typically provide interconnect and/or dispatch voice communication services. Interconnect voice communication services are those typically provided by most cellular carriers as circuit-switched communications. Dispatch communication services are commonly known as a walkie-talkie type of call such as Nextel's service identified by the trade names Push-To-Talk (PTT) or Direct Connect. Interconnect voice communication services provided by most cellular carriers can be provided between sources and destinations of different cellular carriers. However, dispatch communication services are typically implemented in a proprietary manner which prevents dispatch calls from originating in one cellular carrier's network and terminating in another cellular carrier's network.

SUMMARY OF THE INVENTION

[0002] A system and method interworking dispatch interoperability across wireless carriers is provided. In accordance with one embodiment, the system includes a plurality of wireless carrier networks, each wireless carrier network including an interworking server and a QuickConnect infrastructure. The QuickConnect infrastructure provides a drop-off point and transport facility for each of the wireless carriers, and the QuickConnect infrastructure monitors and manages service agreements with each of the plurality of wireless carriers,



facilitates propagation of route information, enables roaming registration and propagation of group definitions. In accordance with another embodiment, the QuickConnect infrastructure includes inter-carrier and interworking servers, each inter-carrier server facilitates pass-through of dispatch sessions involving origination and terminations on the same dispatch technology, and the interworking servers perform translation between sessions originating and terminating in wireless carrier networks which employ different dispatch technology. In accordance with yet another embodiment the system includes a plurality of wireless carrier networks, wherein at least two of the wireless carrier networks operate using different dispatch technologies, and a QuickConnect infrastructure. In this embodiment dispatch sessions from each of the plurality of wireless carrier networks are translated into a common protocol within the QuickConnect network, and are translated into a protocol compatible with a destination wireless carrier network.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Figure 1 illustrates an exemplary dispatch interworking architecture in accordance with a first embodiment of the present invention;

[0004] Figure 2 illustrates an exemplary physical representation of the dispatch interworking architecture in accordance with the first embodiment of the present invention;

[0005] Figure 3 illustrates an exemplary dispatch interworking architecture

in accordance with a second embodiment of the present invention;

[0006] Figure 4 illustrates an exemplary site redundancy for the interworking architecture in accordance with the second embodiment of the present invention;

[0007] Figure 5 illustrates an exemplary signaling flow for the interworking architecture in accordance with the second embodiment of the present invention;

[0008] Figure 6 illustrates an exemplary physical representation of the interworking architecture in accordance with the second embodiment of the present invention;

[0009] Figure 7 illustrates an exemplary physical view of the interworking architecture in accordance with a third embodiment of the present invention;

[0010] Figure 8 illustrates an exemplary dispatch interworking architecture in accordance with a fourth embodiment of the present invention

[0011] Figure 9 illustrates an exemplary signaling flow for the interworking architecture in accordance with the fourth embodiment of the present invention;

[0012] Figure 10 illustrates an exemplary physical view of the interworking architecture in accordance with the fourth embodiment of the present invention;

[0013] Figure 11 illustrates a variation of the interworking architecture of the fourth embodiment of the present invention;

[0014] Figure 12 illustrates an exemplary signaling flow for a dispatch call

within the same point of presence for the interworking architecture of the fourth embodiment of the present invention;

[0015] Figure 13 illustrates an exemplary signaling flow for a dispatch session across points of presence for the interworking architecture of the fourth embodiment of the present invention;

[0016] Figure 14 illustrates an exemplary signaling flow for a dispatch session across the same point of presence but different gateways for the interworking architecture of the fourth embodiment of the present invention; and

[0017] Figure 15 illustrates an exemplary signaling flow for the interworking architecture in accordance with the variation of the fourth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] Four different embodiments with different architecture options for facilitating dispatch inter-operability across wireless carriers with disparate dispatch technologies are disclosed herein.

[0019] Figure 1 illustrates an exemplary architecture in accordance with the first embodiment of the present invention. This architecture assumes that the inter-working servers are deployed and managed by the dispatch service providers themselves. The QuickConnect network provides a drop off point and transport

facilities to each service provider. It may also provide DNS service to assist in enabling a full mesh connectivity.

[0020] The QuickConnect network monitors and manages the service agreement with each network, facilitates propagation of route information, enables roaming registration and propagation of group definitions. This architecture assumes that the dispatch session control is anchored in the originating network. The clearinghouse can facilitate a variety of billing and reconciliation bundles.

[0021] The architecture accounts for link, element and site redundancy via onsite and geographically located standby configurations. The standby configurations may be deployed in load sharing or hot backup modes. Each carrier is linked to a standby region, and each region is be connected to geographically redundant clearinghouse infrastructure.

[0022] Finally, the service delivery layer and the associated resource adaptor (SAM) shall also be deployed to enable application offering across carriers. The resource adaptor is used to abstract out the dispatch signaling and routing function from the service delivery layer, thereby enabling a common set of APIs that span across all dispatch technologies.

[0023] There are two options available for routing session packets between originating and terminating carriers. In the first option, the routing information of each carrier is propagated to all other carriers thereby enabling a full mesh of

routing table at each carrier. In this option, the QuickConnect network shall perform packet routing based on the destination IP address, oblivious of the embedded session information.

[0024] In the second option, each carrier is only aware of the QuickConnect network, thereby forming a star connection. In this option, the originating carrier routes the session to the QuickConnect network (based on the domain analysis of the terminating user), which will then perform domain translation to obtain the IP address of the terminating domain and forward the packets to the terminating carrier.

[0025] Figure 2 illustrates an exemplary physical representation of the dispatch inter-working architecture of option 1 of the first embodiment architecture. Option 2 of the first embodiment requires that proxy servers be also deployed in each region to facilitate domain translation.

[0026] Figure 3 illustrates an exemplary architecture in accordance with the second embodiment of the present invention. This architecture assumes that the inter-carrier (connecting same dispatch technology) and inter-working (connecting different dispatch technologies) servers are deployed within the QuickConnect network. The custom inter-carrier servers (from vendors) are deployed on a need basis to facilitate pass through of sessions involving originations and terminations on the same technology. The custom inter-carrier servers are optional, depending upon the architecture of various dispatch technologies to support cross-carrier

operations. The pass through of same technology sessions avoids the performance degradation due to translations to a common protocol. The custom inter-carrier servers shall be needed for each dispatch technology supported via the QuickConnect network. The custom inter-carrier servers may just be enhanced SIP proxy servers.

[0027] For sessions spanning differing technologies, inter-working servers that perform translation across different technologies would still need to be deployed as depicted in Figure 3. These servers will translate signaling and media format of each dispatch technology into a common format proprietary to the QuickConnect network and vice versa, thereby enabling various dispatch technologies to inter-operate with each other.

[0028] This architecture also facilitates flexible deployment of customer dispatch inter-carrier servers depending on the traffic profiles and allows for geographic redundancy as depicted in Figure 4. Each point of presence (POP) need not contain the full set of inter-carrier servers for all dispatch technologies. The inter-carrier servers associated with the dispatch technologies deployed by the carriers being served by each POP may be deployed within that POP.

[0029] As before, the originating dispatch carrier forwards the session request to the QuickConnect network. The proxy function determines if the terminating carrier deploys the same dispatch technology or different dispatch technology via address/domain translation. It may also check for the vocoders supported across

two carriers. The proxy function then routes to custom inter-carrier servers, in case of same terminating dispatch technology, or in case of different technologies, to QuickConnect network's inter-working servers to facilitate interoperability.

[0030] Figure 5 illustrates an exemplary signaling flow performed by the QuickConnect network to service an inter-carrier call between two carriers using the same dispatch technology, example being QChat in accordance with the second embodiment of the present invention. In this embodiment the customer inter-carrier servers will include SIP proxy servers and media servers to perform transcoding and jitter buffering (if necessary).

[0031] Figure 6 illustrates an exemplary grouping of functional entities into physical elements in accordance with the second embodiment of the present invention. As can be observed, this architecture requires the proxy function to be deployed in each region so that the incoming call can be routed appropriately to inter-working servers in order to avoid degradation in performance (due to unnecessary translation) in sessions spanning the same dispatch technology.

[0032] Figure 7 illustrates the architecture of the third exemplary embodiment of the present invention. This architecture is very similar to the second embodiment. The difference being that the dispatch vendors provide not only the inter-carrier servers for their technology, but also the inter-working servers that perform translation between various dispatch technologies. An example of this scenario would be where each dispatch vendor translates into a common dispatch

technology, for example standard based technology like Push-to-Talk over Cellular (PoC).

[0033] This architecture relies on vendors to provide the necessary solution to inter-work across technologies in addition to inter-carrier operability.

[0034] The core infrastructure for the QuickConnect network does not change. Also, a signaling bridge may be employed to interface the vendor provided dispatch servers to inter-work with the service delivery components. If all vendors settle on a common translation protocol, then the additional signaling bridge shall not be needed; otherwise a custom bridge to operate across various dispatch technologies shall be needed to provide access to the applications residing in the service delivery layer. The operation is the same as for previous embodiment, the only difference being that custom servers do the translation of inter-technology session rather than QuickConnect provided servers.

[0035] Figure 7 depicts a physical layout of the architecture. The core infrastructure remains the same; only the physical elements in each POP and region are changed from the previous architecture. The proxy function is no longer needed, as it shall be part of the offering from the dispatch vendor. However, the custom proxy function shall still need to interface with the address translator to translate domains/realms into routable addresses.

[0036] Figure 8 illustrates the high level view of the architecture in accordance with the fourth embodiment of the present invention. In this

architecture option, irrespective of the originating and terminating technologies, the originating call is translated into common signaling within the QuickConnect network before call processing. Upon session processing, the call is translated back into the terminating technology before being forwarded to the called party.

[0037] Figure 9 illustrates an exemplary signaling flow in accordance with the fourth embodiment of the present invention. The regional network routes incoming session to an inter-working server. The inter-working server translates the incoming session into a common format, proprietary to the QuickConnect network. The QuickConnect network servers process the call, locate the domains of the terminating users, check for vocoder mismatch, set up media servers, and translate the session into the terminating technology format and forward the request to the terminating carrier. The proxy function is not needed since all sessions undergo translation irrespective of the originating and terminating technologies.

[0038] Figures 12 to 14 depict the high-level call flows for the fourth embodiment of the present invention. Figure 12 illustrates signaling for sessions originating and terminating in the same POP. Figure 13 illustrates the sessions originating and terminating in different POPs. Figure 14 illustrates the sessions in which the signaling is for the two legs is in the same controller; however the bearers are setup on two separate paths.

[0039] Figure 10 presents a view of the physical architecture associated with the fourth embodiment of the present invention. As before the core components

remain the same. The difference is in the components deployed at each point of presence. As can be observed, since every session is translated into a common format, there is no need to deploy custom servers from individual dispatch vendors. Moreover, the infrastructure at each POP is identical.

[0040] In the above architectural representation, the signaling bridge is shown to be part of the QuickConnect network. In a variation to this architecture, the signaling bridge can be licensed to individual dispatch vendors, who can then incorporate it into their dispatch servers. This variation of the architecture is presented in Figure 11 and a high level call flow associated with it is depicted in Figure 15. As shown in the call flow, not every carrier needs to deploy the signaling bridge on its premises. The carriers may have the choice of either deploying the signaling bridge on their premises or leverage those that are deployed in the QuickConnect network. In the call flow, the originating carrier has deployed the signaling bridge on its premise, while the terminating carrier is leveraging the signaling bridge deployed within the QuickConnect network.

[0041] The first embodiment is the minimum architecture to support the settlement product offering. It provides the transport infrastructure to individual carriers to enable connectivity between them. This option provides full control to carriers over their subscribers and the technology that enables inter-dispatch operability. This architecture supports end-to-end encryption of both signaling and media between the carriers.

[0042] This architecture lowers the cost of QuickConnect network deployment, as inter-working servers are not needed to service the cross-carrier traffic.

[0043] In this option, inter-working servers are still needed to inter-work with SAM and the application servers residing on and above the service delivery layer. This architecture assumes full mesh connectivity across all carriers, thereby increasing the cost of operations for individual carriers.

[0044] In addition to the base transport service, the third embodiment enables inter-working across different dispatch technologies that may choose not to deploy their own dispatch inter-working solutions. This option provides better latency performance for dispatch sessions as it performs the translation only for those calls that need translation.

[0045] This option may increase call setup latencies due to larger hops that might be encountered via centralized deployment. If a decentralized deployment is chosen, that may increase the cost of deployment and operations, due to the deployment of redundant servers and inefficient utilization of the servers. Moreover, this architecture is beholden to individual dispatch vendors architecture and development schedule thereby leading to potential delays in upgrades, scalability issues and enhanced product offering.

[0046] In the fourth embodiment, since no custom servers are needed, the inter-working infrastructure is common across all POPs, and there is the potential

to derive significant economies of scale in capital expenditure, efficient utilization efficient utilization and load sharing. It is flexible to support either centralized or decentralized deployment. It also reduces the reliance on individual dispatch vendors in determining the product offering roadmap.

[0047] The biggest drawback of this option is that the signaling translation occurs even for scenarios where the originating and the terminating ends are using the same dispatch technology, thereby increasing the call setup and floor arbitration latencies as perceived by the end user. A performance degradation of about 8% was estimated for the QChat technology.

[0048] While the invention has been described in connection with various embodiments, it will be understood that the invention is capable of further modifications. This application is intended to cover any variations, uses or adaptation of the invention following, in general, the principles of the invention, and including such departures from the present disclosure as, within the known and customary practice within the art to which the invention pertains.

What is claimed is:

1. A system for interworking dispatch interoperability across wireless carriers, the system comprising:

a plurality of wireless carrier networks, each wireless carrier network including an interworking server; and

a QuickConnect infrastructure, the QuickConnect infrastructure providing a drop-off point and transport facility for each of the wireless carriers, and the QuickConnect infrastructure monitors and manages service agreements with each of the plurality of wireless carriers, facilitates propagation of route information, enables roaming registration and propagation of group definitions.

2. A system for interworking dispatch interoperability across wireless carriers, the system comprising:

a plurality of wireless carrier networks; and

a QuickConnect infrastructure, the QuickConnect infrastructure including inter-carrier and interworking servers; each inter-carrier server facilitates pass-through of dispatch sessions involving origination and terminations on the same dispatch technology, and the interworking servers perform translation between sessions originating and terminating in wireless carrier networks which employ different dispatch technology.

3. A system for interworking dispatch interoperability across wireless carriers, the system comprising:

a plurality of wireless carrier networks, wherein at least two of the wireless carrier networks operate using different dispatch technologies; and

a QuickConnect infrastructure, wherein dispatch sessions from each of the plurality of wireless carrier networks are translated into a common protocol within the QuickConnect network, and are translated into a protocol compatible with a destination wireless carrier network.

ABSTRACT OF THE DISCLOSURE

A system and method interworking dispatch interoperability across wireless carriers is provided. In accordance with one embodiment, the system includes a plurality of wireless carrier networks, each wireless carrier network including an interworking server and a QuickConnect infrastructure. The QuickConnect infrastructure provides a drop-off point and transport facility for each of the wireless carriers, and the QuickConnect infrastructure monitors and manages service agreements with each of the plurality of wireless carriers, facilitates propagation of route information, enables roaming registration and propagation of group definitions. In accordance with another embodiment, the QuickConnect infrastructure includes inter-carrier and interworking servers, each inter-carrier server facilitates pass-through of dispatch sessions involving origination and terminations on the same dispatch technology, and the interworking servers perform translation between sessions originating and terminating in wireless carrier networks which employ different dispatch technology. In accordance with yet another embodiment the system includes a plurality of wireless carrier networks, wherein at least two of the wireless carrier networks operate using different dispatch technologies, and a QuickConnect infrastructure. In this embodiment dispatch sessions from each of the plurality of wireless carrier networks are translated into a common protocol within the QuickConnect network, and are translated into a protocol compatible with a destination wireless carrier network.

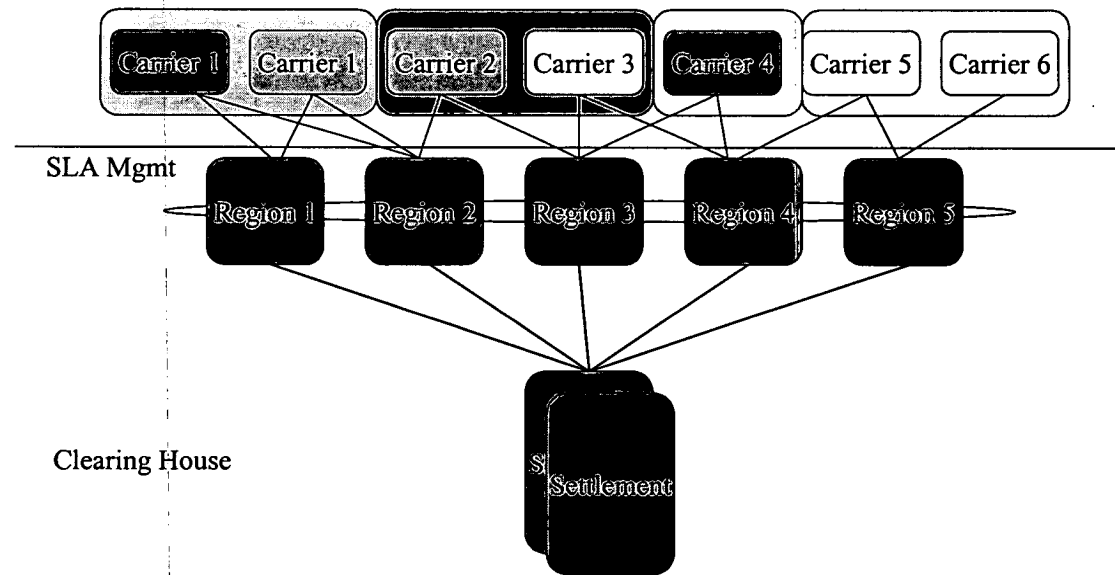


Figure 1

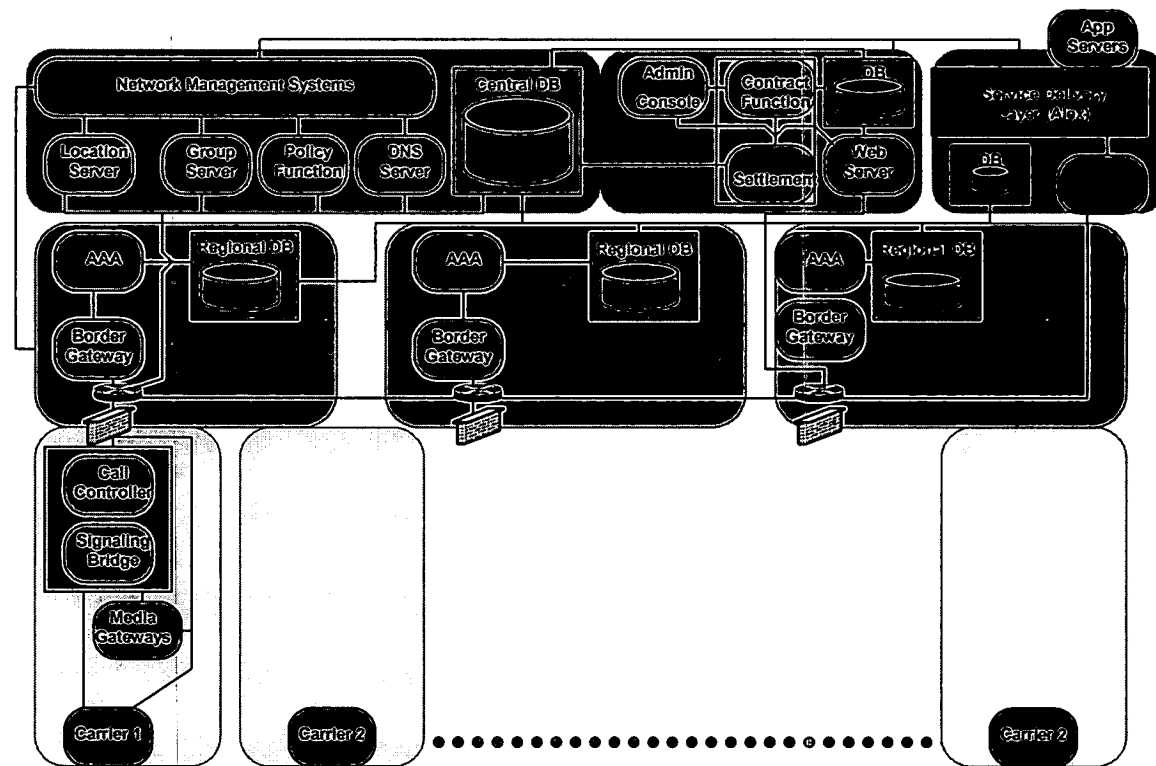


Figure 2

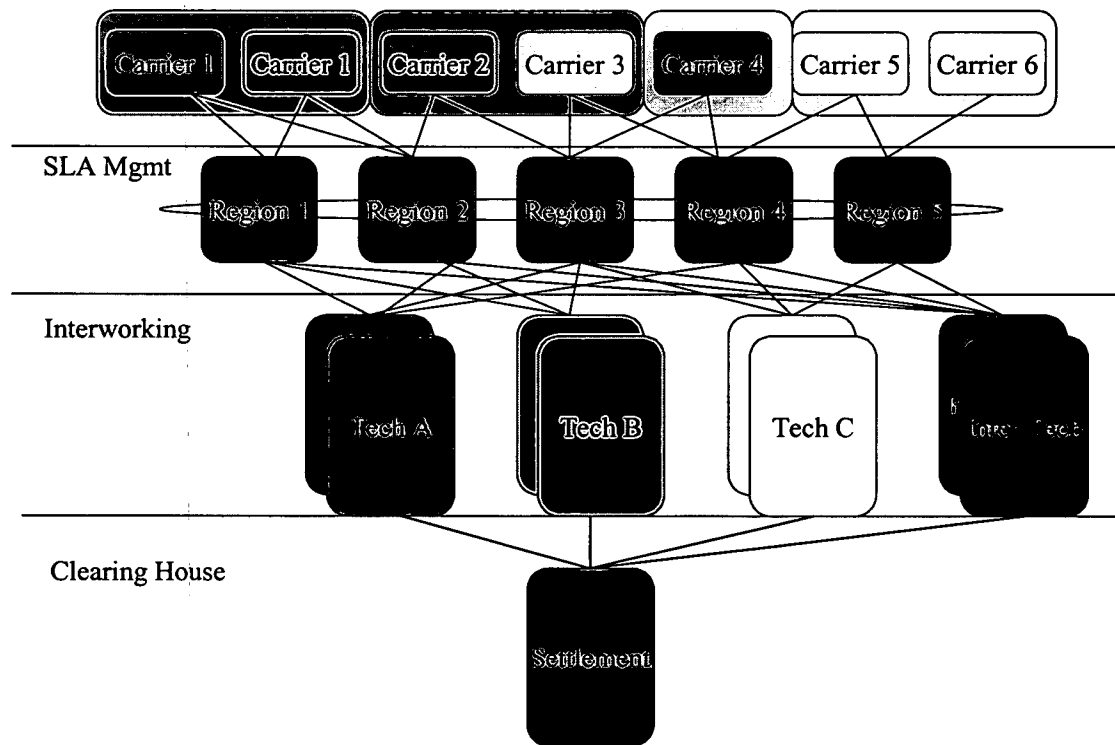


Figure 3

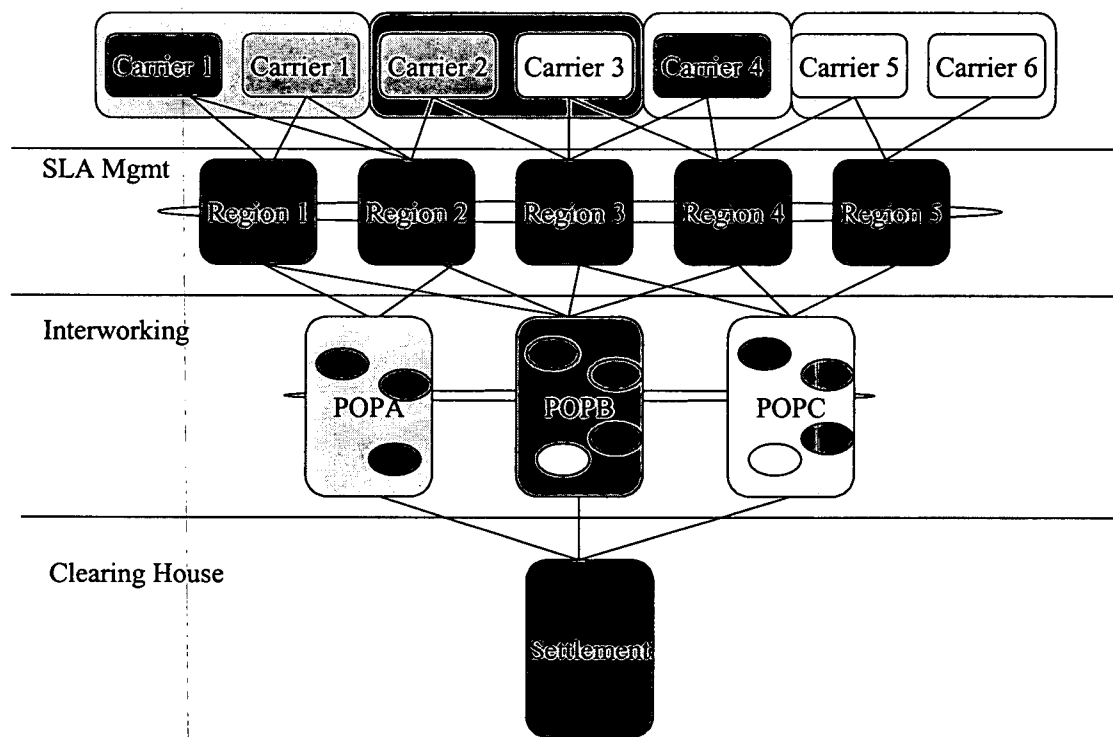


Figure 4

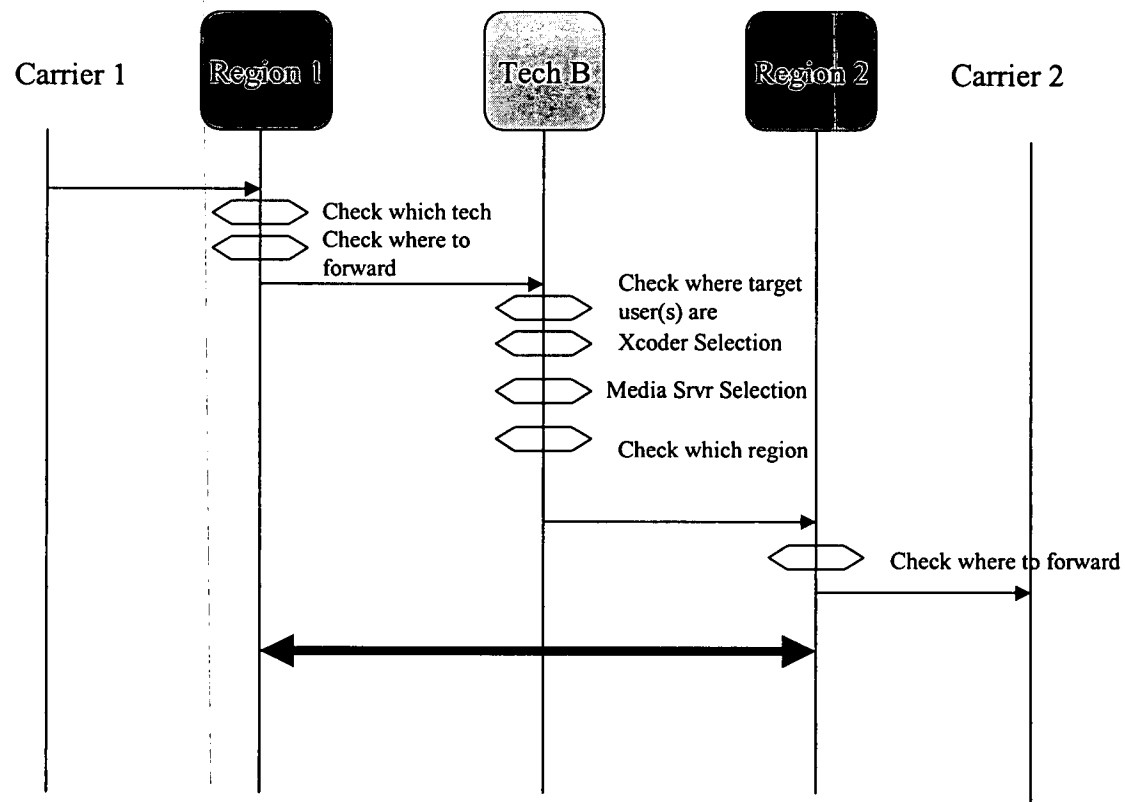


Figure 5

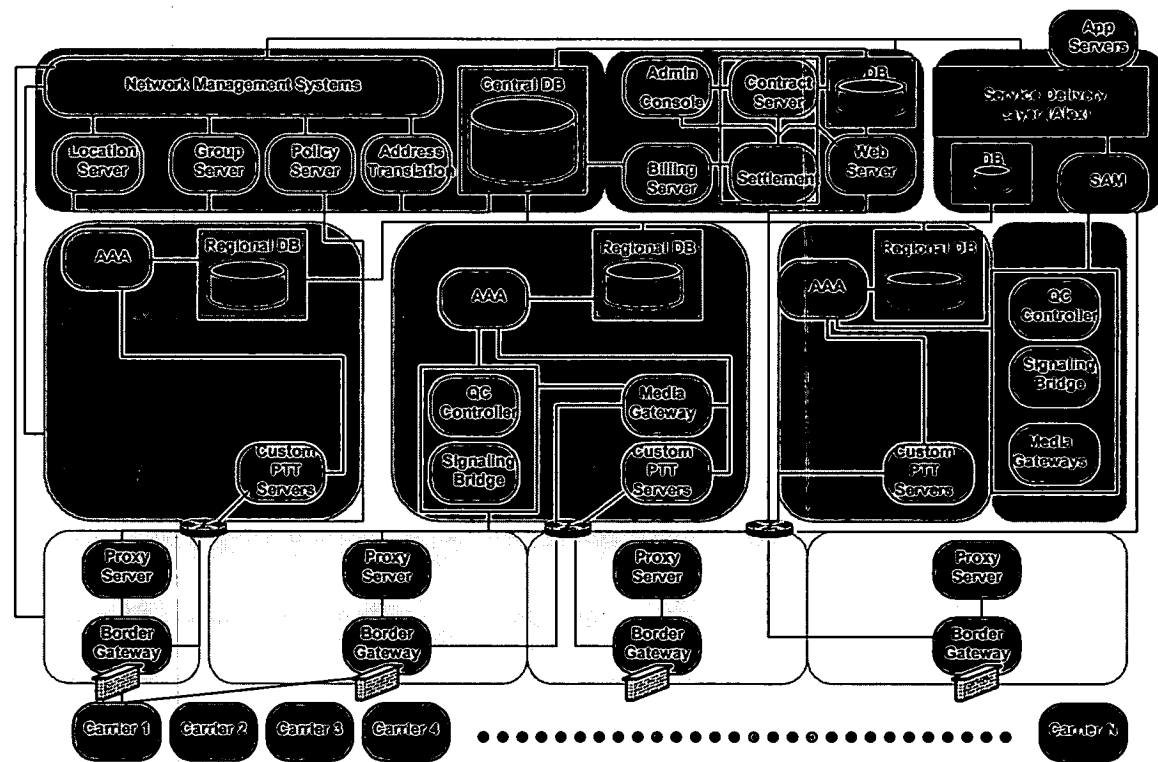


Figure 6

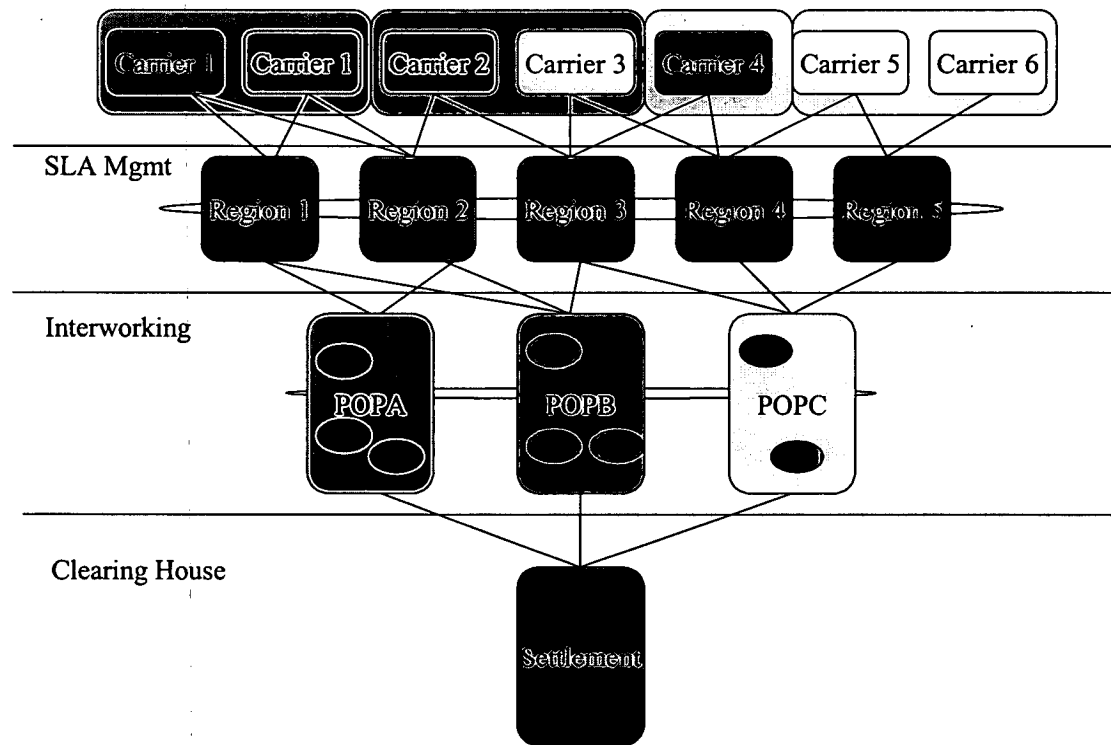


Figure 8

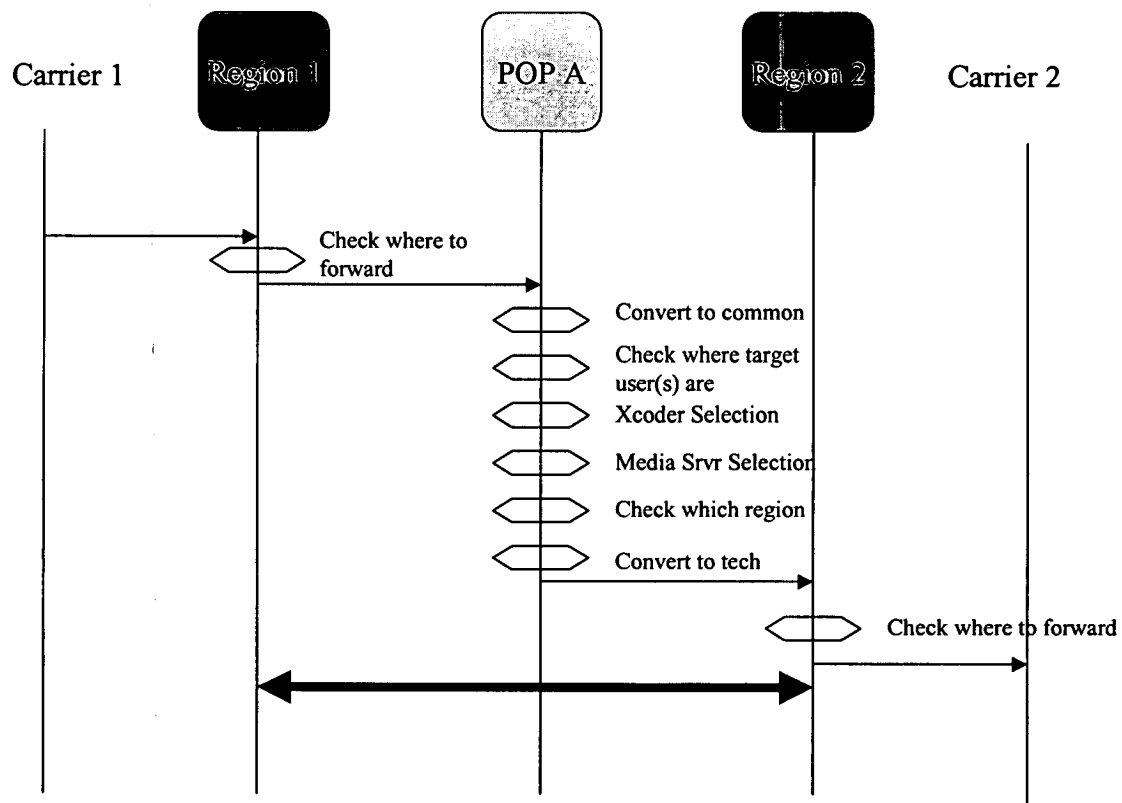


Figure 9

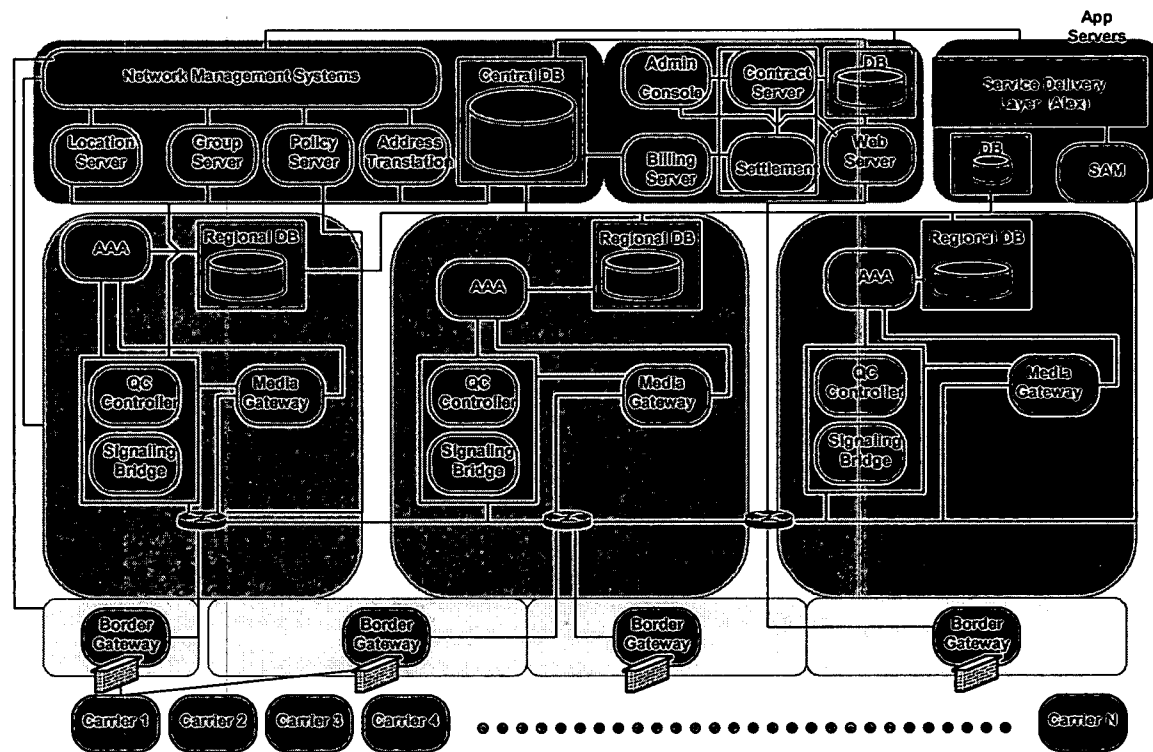


Figure 10

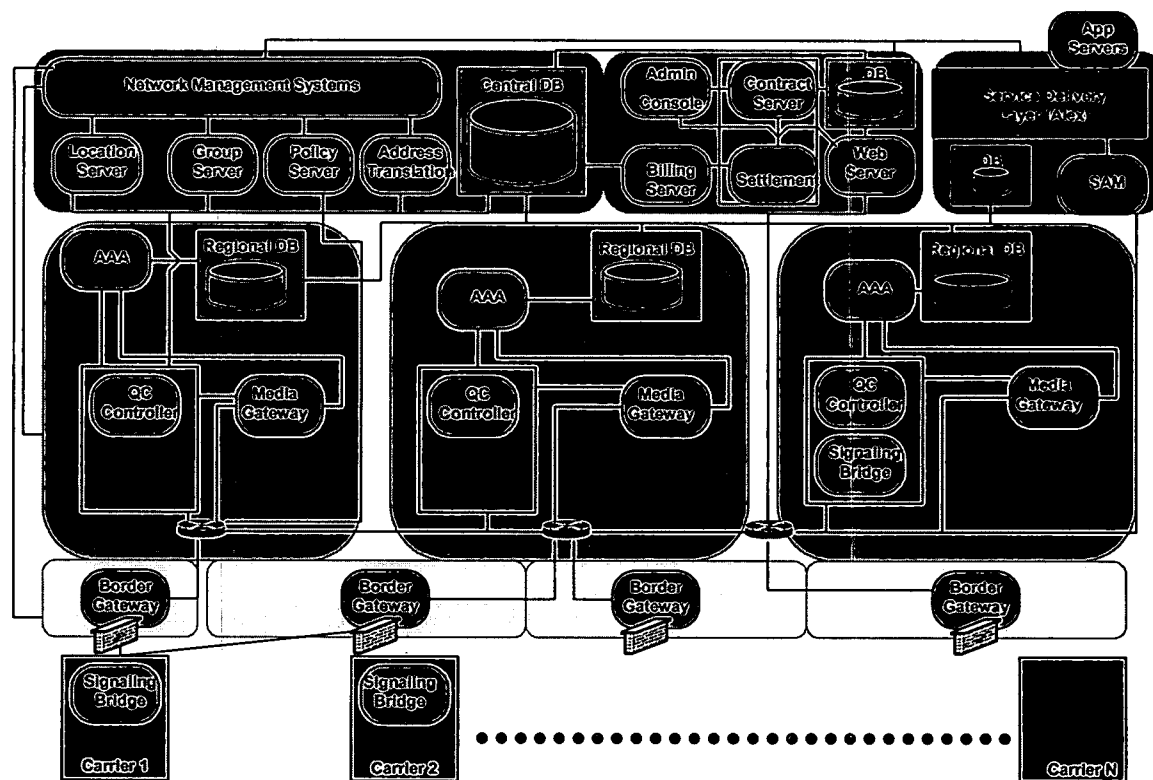


Figure 11

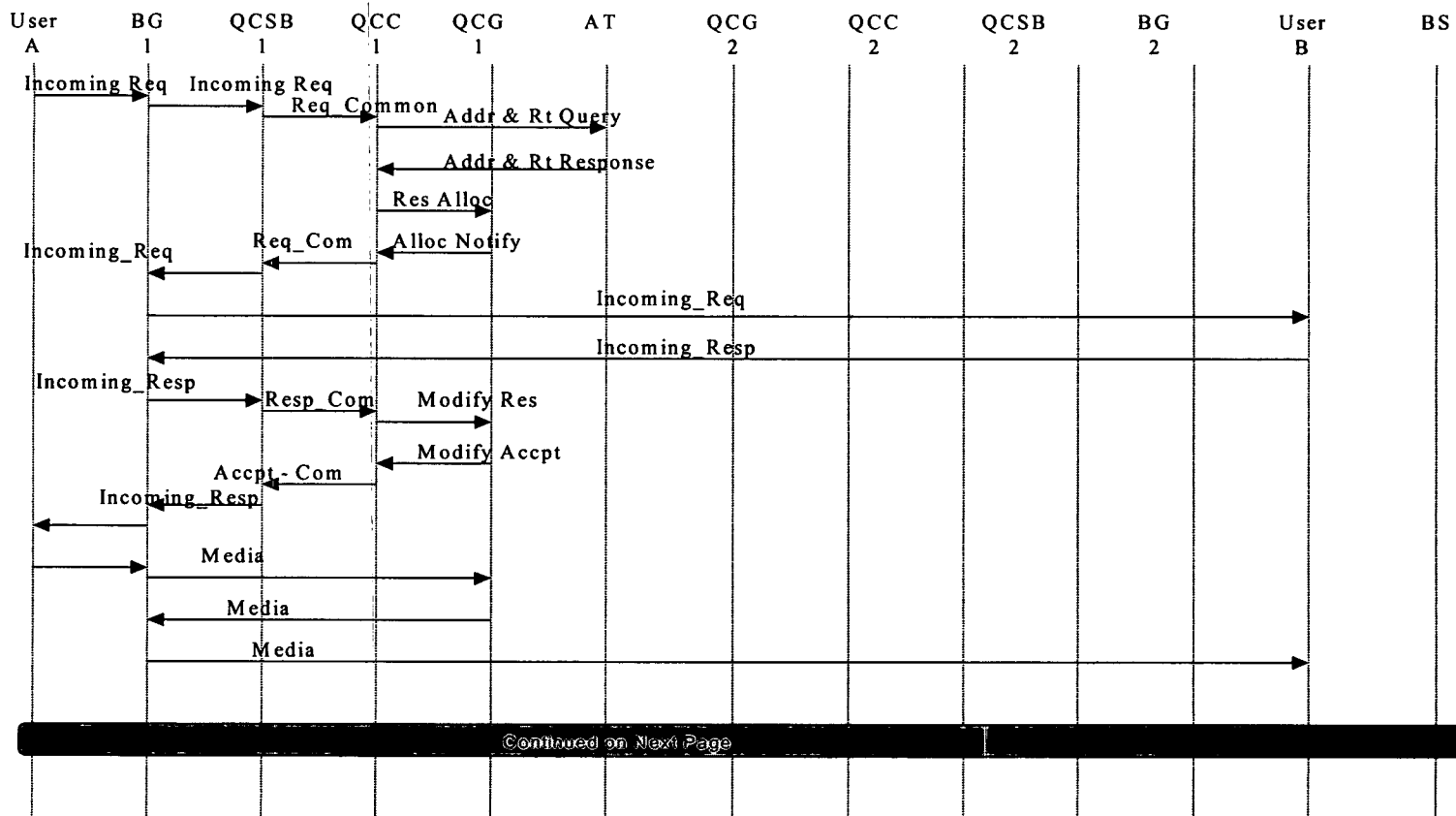


Figure 12

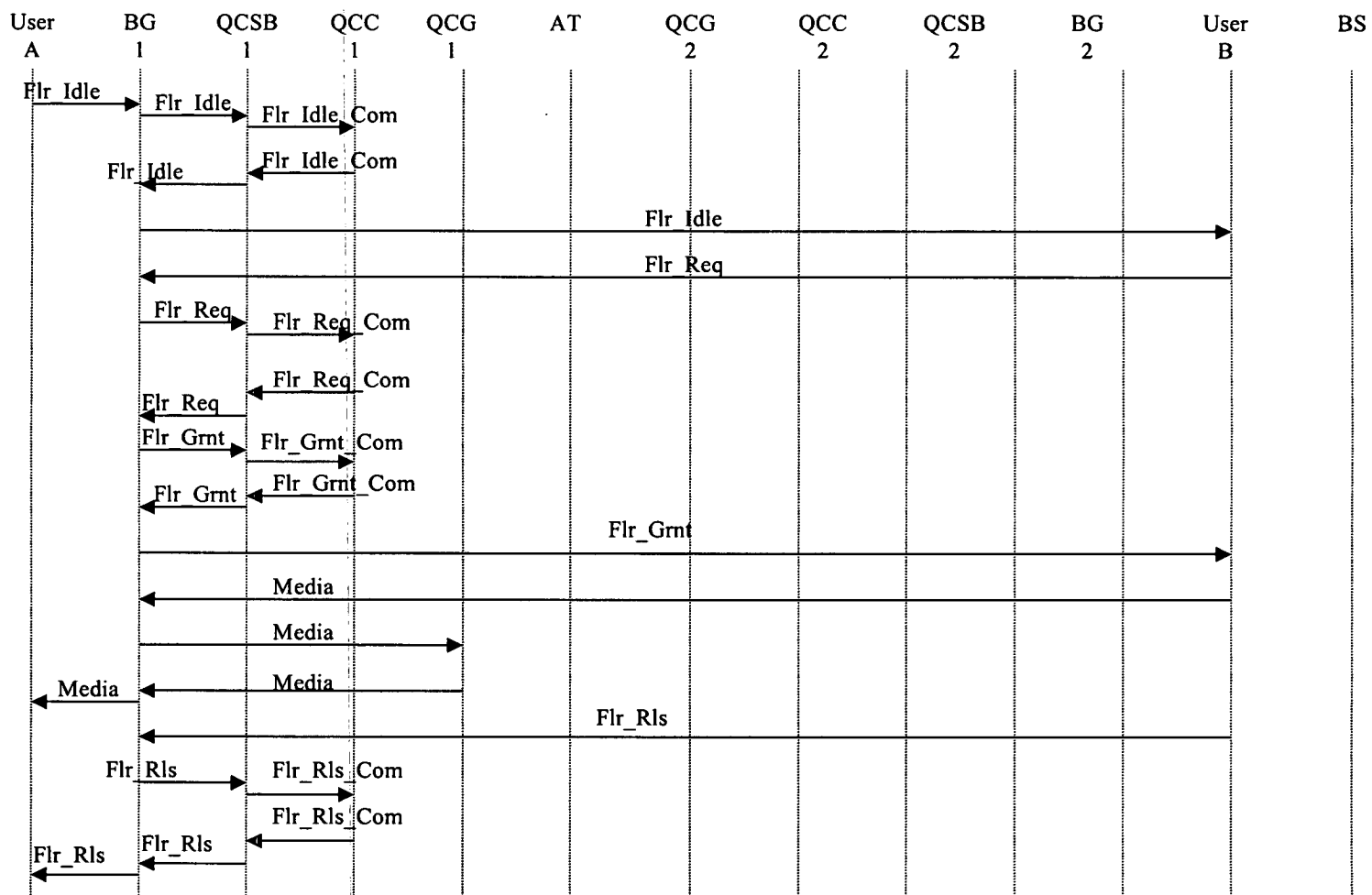


Figure 12 (continued)

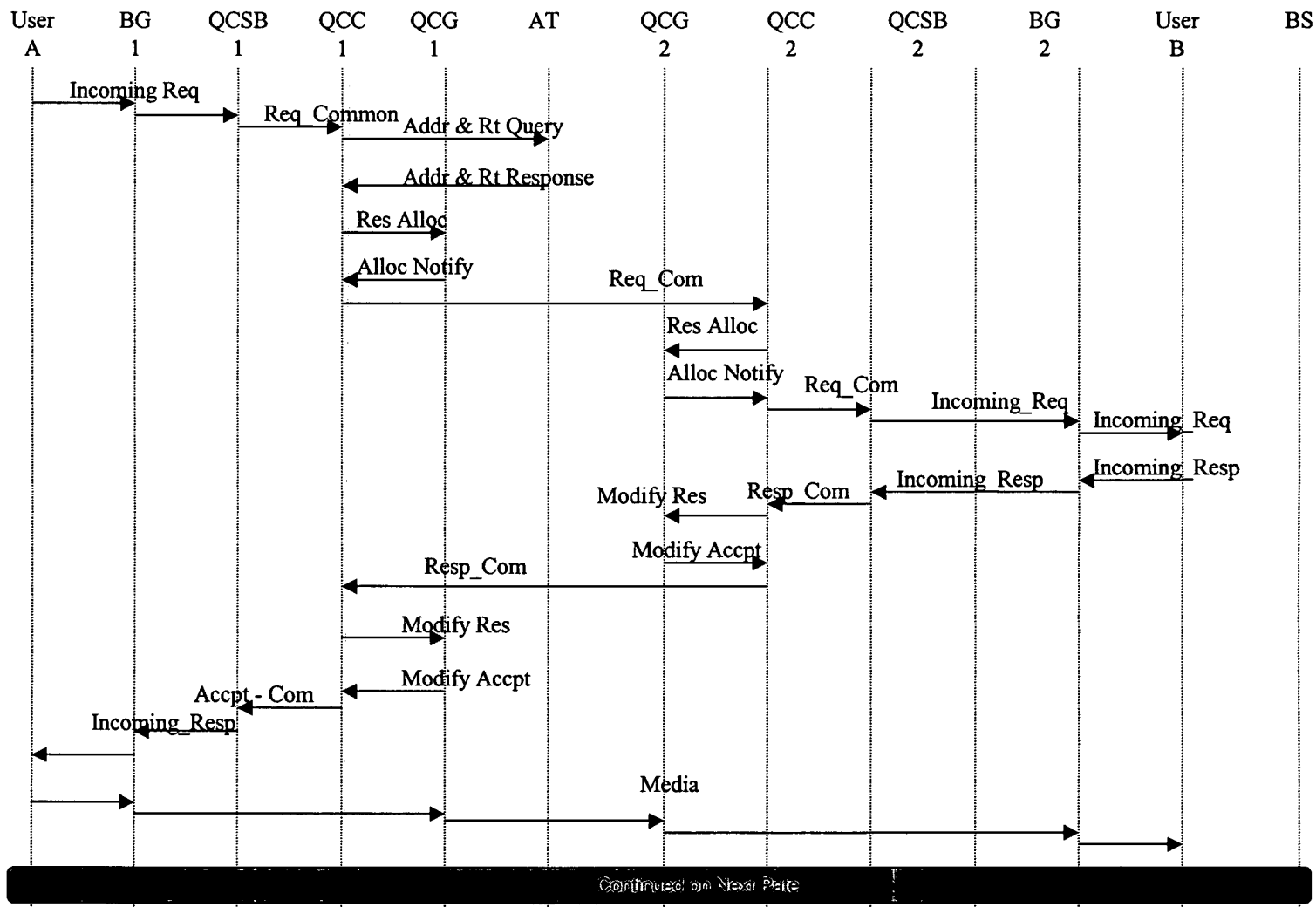


Figure 13

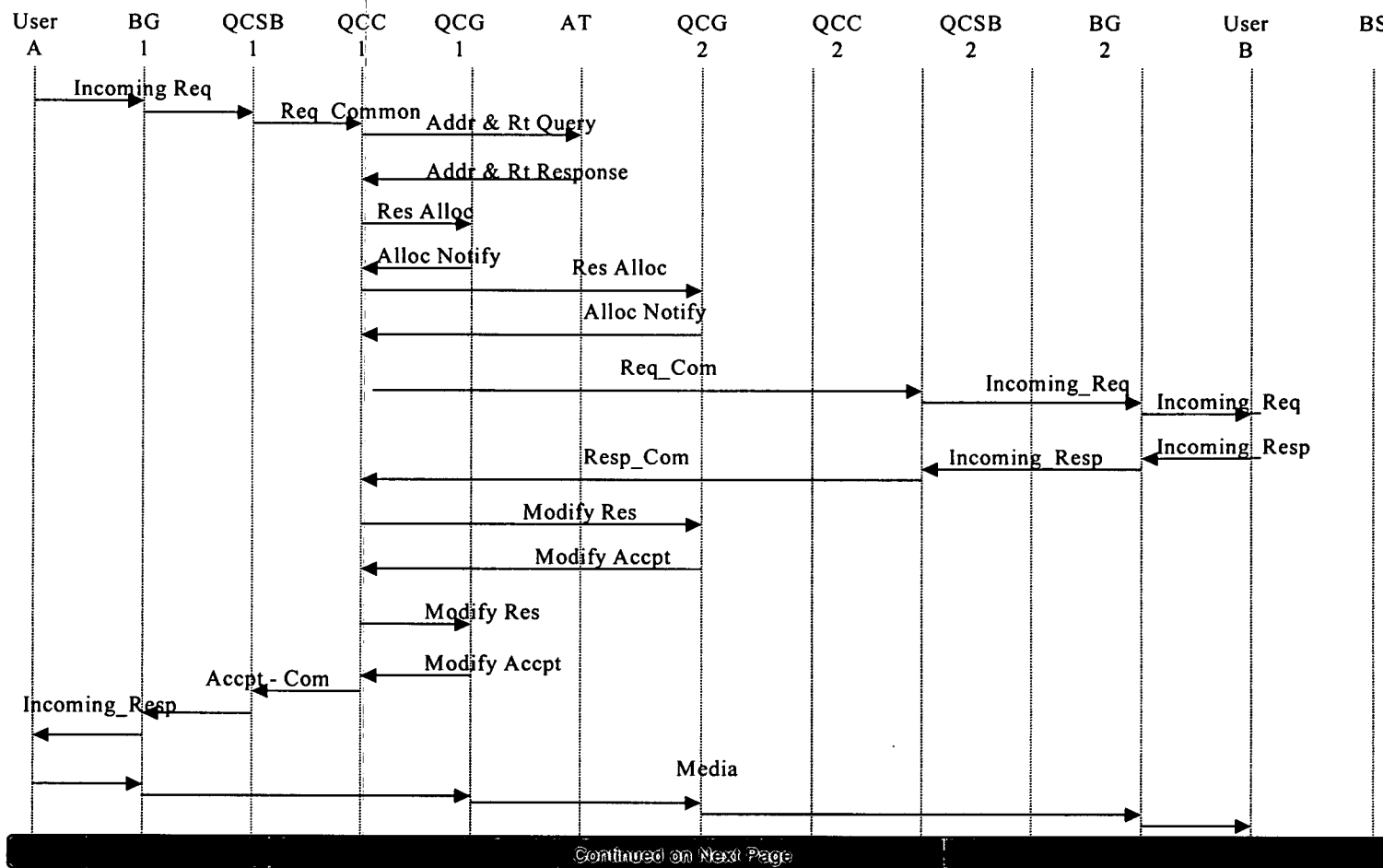


Figure 14

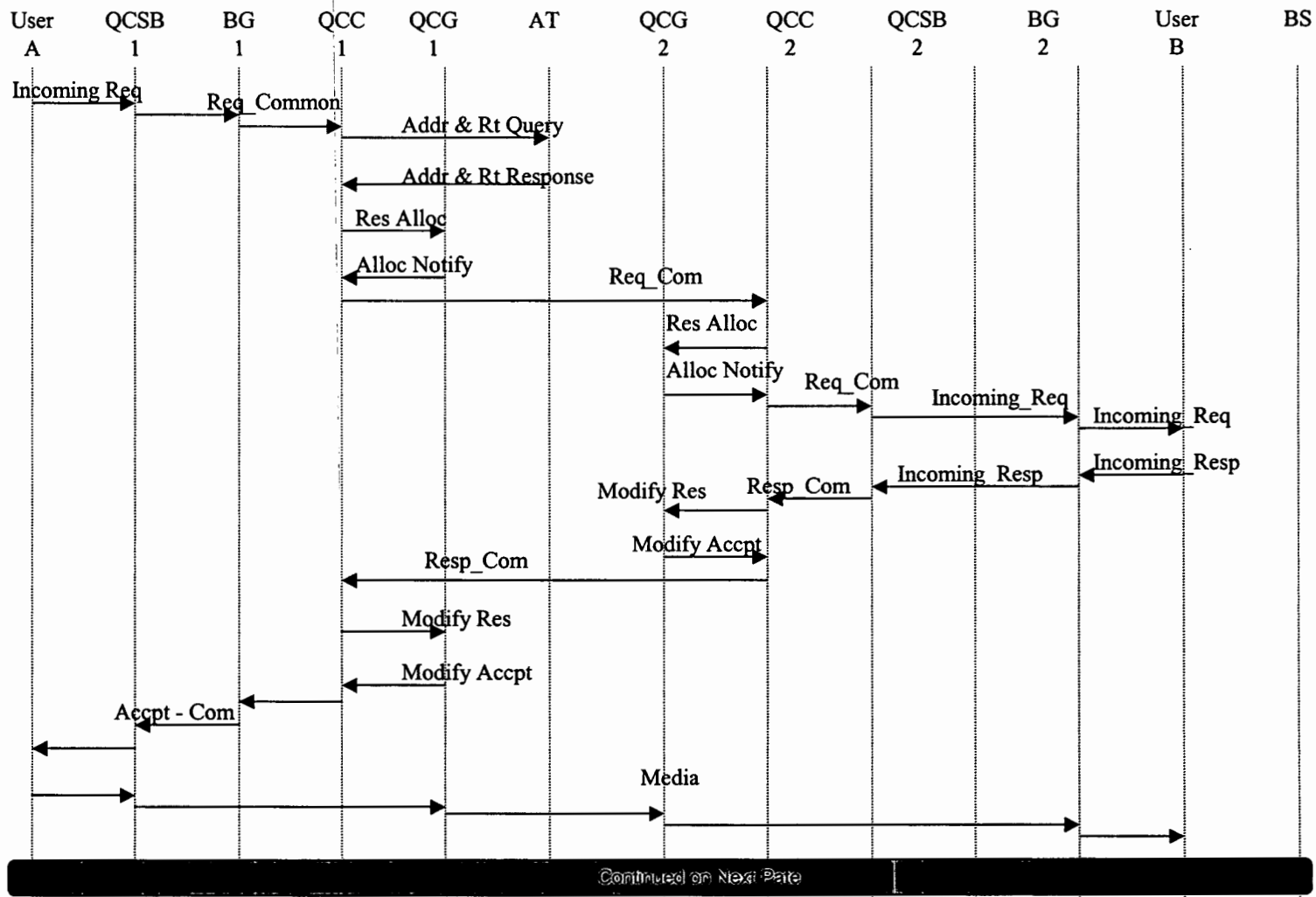


Figure 15

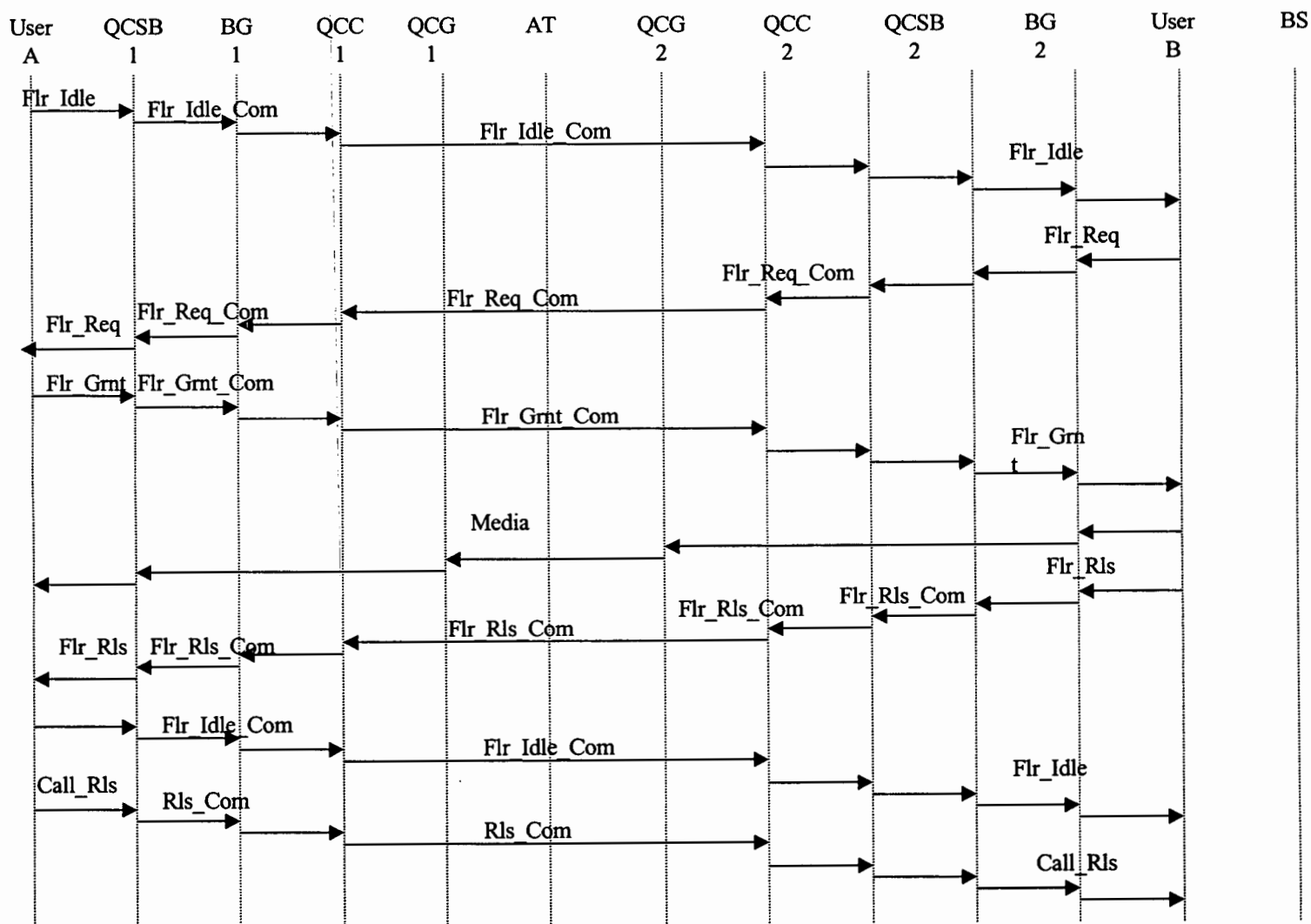


Figure 15 (continued)

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

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160.00 0P

PTO-1556
(5/87)

APPLICATION DATA SHEET

APPLICATION INFORMATION

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Title:: Architecture Options for Signaling
and Media Inter-Working
Attorney Docket No.: 100773.55338PV
Total Drawing Sheets:: 19

APPLICANT INFORMATION

Applicant one Authority Type:: Inventor
Primary Citizenship:: US
Country:: US
Status:: Full Capacity
Given name:: Ojas Thakor
Family name:: CHOKSI
Country of Residence:: US
Street of mailing address:: 2356 Cypress Cove Cir., #203
City of mailing address:: Herndon
State or Province of
mailing address:: VA
Country of mailing address:: US
Postal or Zip Code of
mailing address:: 20171

CORRESPONDENCE INFORMATION

Correspondence customer number:: 23911

REPRESENTATIVE INFORMATION

Representative customer number:: 23911

Initial 09/09/2004