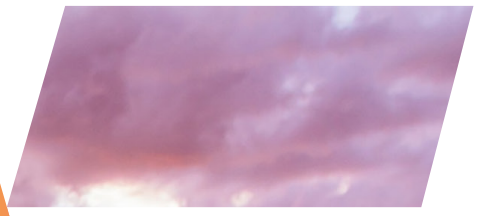
product overview



amdocs routing layer

amdocs

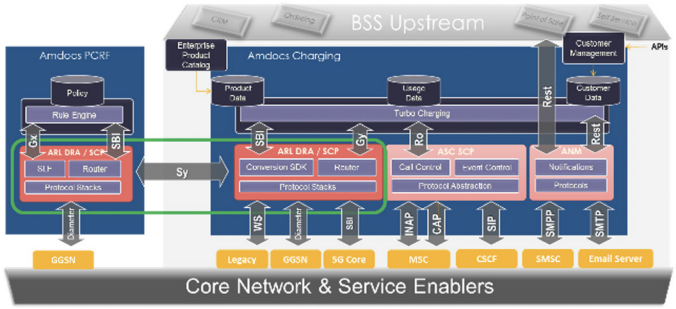
Introduction

The incessant flow of new data services has necessitated more granular charging models (such as flow-based charging) and resource usage control policies (such as fair use), which in turn, has led to a significant increase in the volume of signaling traffic.

The growth in traffic for **Evolved Packet Core (EPC)** and broadband services requires the use of **Diameter Routing Agent (DRA)** systems, with which to scale the network EPC nodes and to manage the Diameter connections across various network elements, like PCRF, PCEF, HSS, MME, AF, 3GPP AAA, and OCS.

Amdocs Routing Layer (ARL) is pre-integrated with the Amdocs Portfolio and is a component of the Amdocs Convergent Charging solution, as shown here:

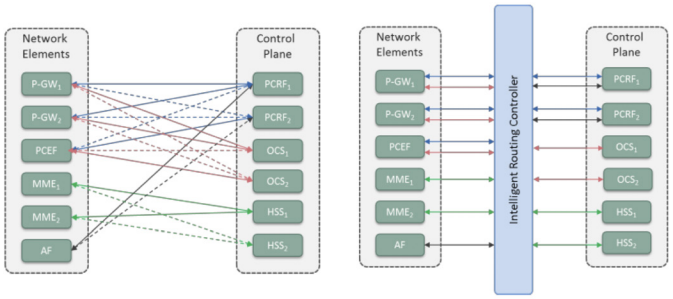
ARL as Amdocs Charging and Policy Enabler



Amdocs Routing Layer provides EPC control plane connectivity and routing, to balance the load of policy and authentication messages across groups of PCRF, OCS, HSS, or AAA clusters. By centralizing these signaling, routing and load-balancing tasks, the control plane can scale to meet the growth of EPC, LTE and IMS networks incrementally and cost-effectively.

Amdocs Routing Layer is designed for LTE, IMS, LTE to LTE roaming, and legacy-to-LTE solutions, and can function as Diameter Agent, DRA and DEA and IWF.

LTE Deployment: Without (Left) and with (Right) Amdocs Routing Layer

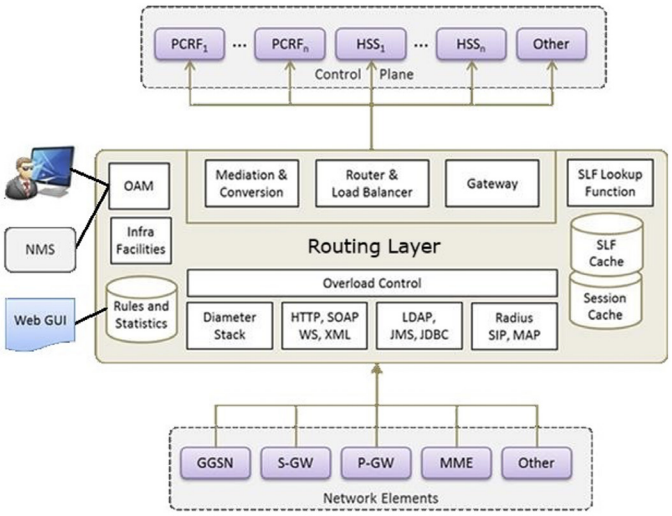


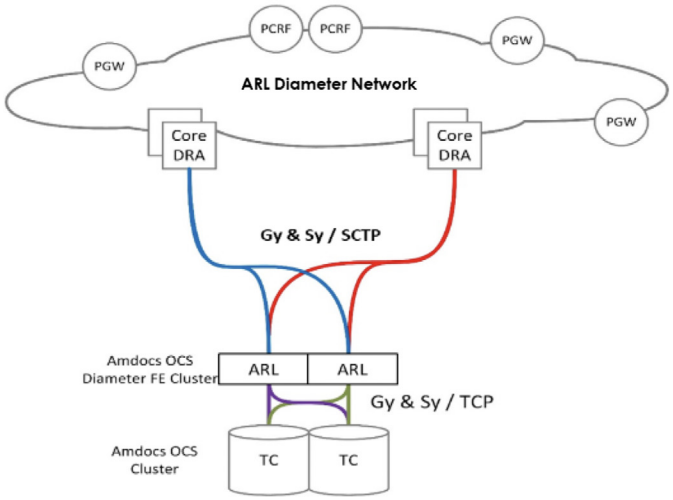
ARL is a flexible, powerful and easy-to-deploy system designed for the most challenging control plane environments.

Enabling topology hiding, Diameter protocol routing, mediation and inter-working functions, it provides overload and failover management, using congestion control mechanisms.

ARL advanced routing-management tools, allow service providers to implement various routing rules and policies as necessary, to satisfy the business requirements
ARL provides network connectivity to Diameter and non-Diameter charging clients and integration with policy servers (PCRF).

Amdocs Router Layer High-Level Architecture





Amdocs Routing Layer consists of the following components:

- Diameter Router and Load-Balancing
- Protocol Adaptation Layer
- Protocol Conversion Logic

The protocol conversion framework allows for HTTP/REST or SOAP, Radius to Diameter protocol conversion, and the addition of new protocols. The protocol adaptation toolbox is a set of tools that supports Diameter adaptation, or the adaptation of existing protocol conversion logic.

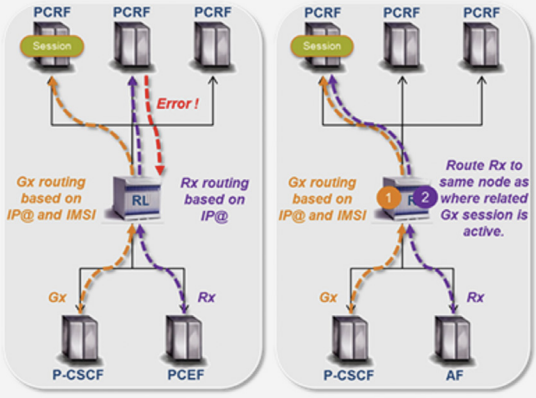
ARL provides out-of-the-box support with a wide range of standard protocols and interfaces, in addition to Diameter base protocols: Gx, Rx, Gy, Sy, S9, Sh/Dh, S6a/S6d, S6b, Cx. SWx/SWa, SWd/Sta, SWm, SOAP, REST, and SBI. In addition, it is possible to custom implement others, like Radius and GTP.

ARL has the flexibility to support new Diameter interfaces, and provides seamless and transparent support for any vendor-specific AVPs.

On the network level, ARL provides support for IPv6 and IPv4. On the transport layer level, TCP and SCTP are supported simultaneously for Diameter. It allows interconnection between two peers that use different transport protocols (SCTP and TCP) or that use different IP versions (IPv4 and IPv6). SCTP Multi-Homing is also supported.

Amdocs Routing Layer provides efficient routing algorithms for routing Diameter requests directly to the correct OCS, PCRF or HSS.

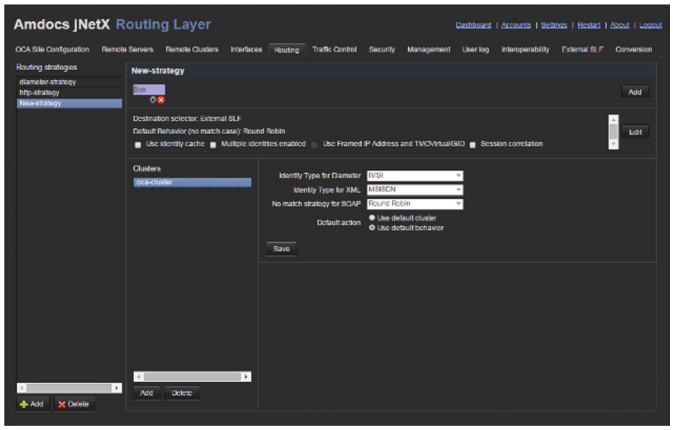
Amdocs Routing Layer Feature Highlights

FEATURE	DESCRIPTION
Basic Routing	Performed using a number of routing methods and can be based on the following algorithms: • Round Robin • Random • Weighted Round Robin • Adaptive less loaded Congestion control, health checking and throttling mechanisms protect network peers from overload and allow timely redistribution of traffic from overloaded or faulty nodes to the available healthy nodes.
Bound Routing	Enables routing a Diameter session to the same destination peer, as an existing referenced session (e.g. binding between Rx and Gx). **Example: No Binding (L)/Binding (R) on Local ARL Node** 
Look-up based Routing	First retrieves the subscriber identity from an incoming request (as either a specific Diameter AVP or HTTP parameter, (e.g., IMSI, MSISDN, EMEI). Second, tries to match subscriber ID with a pre-configured set of rules.
Advanced Internal SLF Routing	Routing rule scripting is achieved by using an internal SLF with complex user-defined rules. Facilitates Access to the cache (put/get) for session-id-to-cluster mapping and checking incoming messages for specific AVPs.
No match Routing	No match routing employs pre-defined strategies that enable the processing of messages that do not match a routing rule: Reject with Error, or Random or Round Robin.

FEATURE	DESCRIPTION
Redirection	A message only returns routing information to the clients, and does not relay or proxy. The routing information provided to the client is based on RFC 3588, for a pre-defined amount of time that can be configured by the user.
Reverse Routing	Server-initiated messages must contain the Destination-Host AVP, to ensure routing messages to the client. Uses both In-session and Out-of-session.
Emergency Routing	Routing of emergency sessions by checking the Calling-Station-Id AVP. Using any of the available routing methods.
Protocol Adaptation	Ability to modify Diameter requests and responses, to ensure interoperability between network elements.
Traffic Control	Ability to limit traffic, and to protect servers from overload, including traffic throttling.
Load Balancing	Provides a number of methods for load distribution across multiple peers in the pool: • Random • Weight-based • Adaptive Less-Loaded • Hashkey-based • User-defined
Network Protection & Security	Network security features are provided at both IP and application levels: • Access control for incoming connections • Network Topology Hiding Activated when the system is deployed as an EDGE Diameter router • Routing Loop Prevention-When routing traffic towards another site • Application-level security and authorization together with IP-level protection based on ACLs, enables protection against IPX flooding events and DOS and DDOS attacks

FEATURE	DESCRIPTION
Degraded Mode	Configurable strategy for processing failed Diameter requests. For example, if all peers in the destination remote cluster are down.
Overload & Congestion Control	Provides health check mechanisms, with which to handle accidental traffic spikes, and enable protection against a specific load level. Rejects/drops some of the incoming messages, to save system resources, to process the remaining sessions without impact, at the agreed Quality of Service levels.
Operations, Administration and Maintenance Support	Provides a Web GUI to support the following Operation, Administration, and Maintenance functions: • Configuration and installation of the ARL cluster • Backup and Restore • Lifecycle management • Security management • Resource usage monitoring • Fault management via events and alarms • Trace and log management • KPI report management • Diameter peer configuration and management • Routing and load balancing configuration • Protocol conversion configuration • Remote provisioning (Automation API)
User Roles & Permissions	Each ARL user entity has a set of roles assigned to it during User Creation. Each role has a set of associated permissions. ARL checks whether the user has the required permissions, to perform the given operation. It is possible to create an arbitrary number of user roles.

FEATURE	DESCRIPTION
High Availability	The N+1 cluster architecture enables 5x9 (99,999%) availability: Nodes are stateless, and session and state data are replicated. Therefore, the failure of a cluster element does not affect traffic processing. Moreover, the failure monitoring framework organizes failover and failback.
Geo-Redundancy	Amdocs Routing Layer supports geo-redundancy routing, where the set of network elements are defined with two routes (Primary/Secondary). Session states are replicated across sites, to enable seamless routing in case of site failure. The first group of network elements is configured to connect to the primary site, and failover to the secondary site. The reverse is true for the second group of network elements.
Virtual IP Address	Provides a single-entry point for Diameter and HTTP traffic.
Performance	ARL two-way latency is 4ms, each node can support up to 35000 TPS per back-end. The number of backends can scale up to 12 nodes and can support up to 200 million simultaneous sessions. Built-in mechanisms for performance measurements and statistics collections enable the operator to perform real-time monitoring of ARL and all servers connected with it. This information is available using the ARL management console and is exposed to external monitoring systems.
Monitoring and KPI	Failure and other major events are notified to the platform operator. The Counters framework collects an extensive set of statistical data to report to the business.
API Automation	The ARL supports API for configuring and operating the platform; therefore, it can be integrated with deployment orchestrators, like VNF.



Platform and Operating System

Cost-effective, carrier-grade, commercial hardware is used. Off-the-shelf solutions are used for Virtual IP, Data Replication and Persistency, supporting linear scalability, failover and geo-redundancy for the Amdocs Routing Layer.

For example:

- IBM x-series Blade Center, using Intel Xeon based blades (Intel® Xeon® CPU E5-2640 0 @ 2.50GHz or Intel® Xeon® CPU E5-2690 v2 @ 3.00GHz with 64GB+ of RAM)
- HP Blade System
- VMware or KVM virtualization environment

ARL will run on Red Hat Enterprise Linux 7.4 64-bit version or greater with the latest patches, using OpenJDK 1.8 or Java 1.8.

An ARL cluster can consist of up to 18 hosts, depending on the cluster configuration specifics.

The solution can be deployed with a standard installer, OpenStack Heat, or as a VNF, as it is supporting API automation.

The Amdocs 5G Routing Layer supports the 4G to 5G signaling transition with Nchf SBI to Diameter Interworking, with protocol Conversion and Routing. In addition, Amdocs is evolving ARL to support 5G routing and load-balancing: NRF, SCP, SEPP, BSF.

The Amdocs 5G ARL roadmap also includes the support of NEF services in the 5G ARL for the services related to its portfolio.

Together with 5G evolution, the ARL is getting Cloud Native, supporting Docker containers and Kubernetes deployment and elasticity.

For further information, please contact
bheuse@amdocs.com

about amdocs

Amdocs' purpose is to enrich lives and progress society, using creativity and technology to build a better connected world. Amdocs and its 25,000 employees partner with the leading players in the communications and media industry, enabling next-generation experiences in 85 countries. Our cloud-native, open and dynamic portfolio of digital solutions, platforms and services brings greater choice, faster time to market and flexibility, to better meet the evolving needs of our customers as they drive growth, transform and take their business to the cloud. Listed on the NASDAQ Global Select Market, Amdocs had revenue of $4.1 billion in fiscal 2019.
For more information, visit Amdocs at www.amdocs.com.

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