



Jio CHF-PC

5G Charging Function Protocol Converter

Protocol Converter for Interworking of 4G and 5G Networks

Part of Jio's complete End-to-End 5G-product offering

Carrier Grade | High Capacity | Fault Tolerant | Scalable

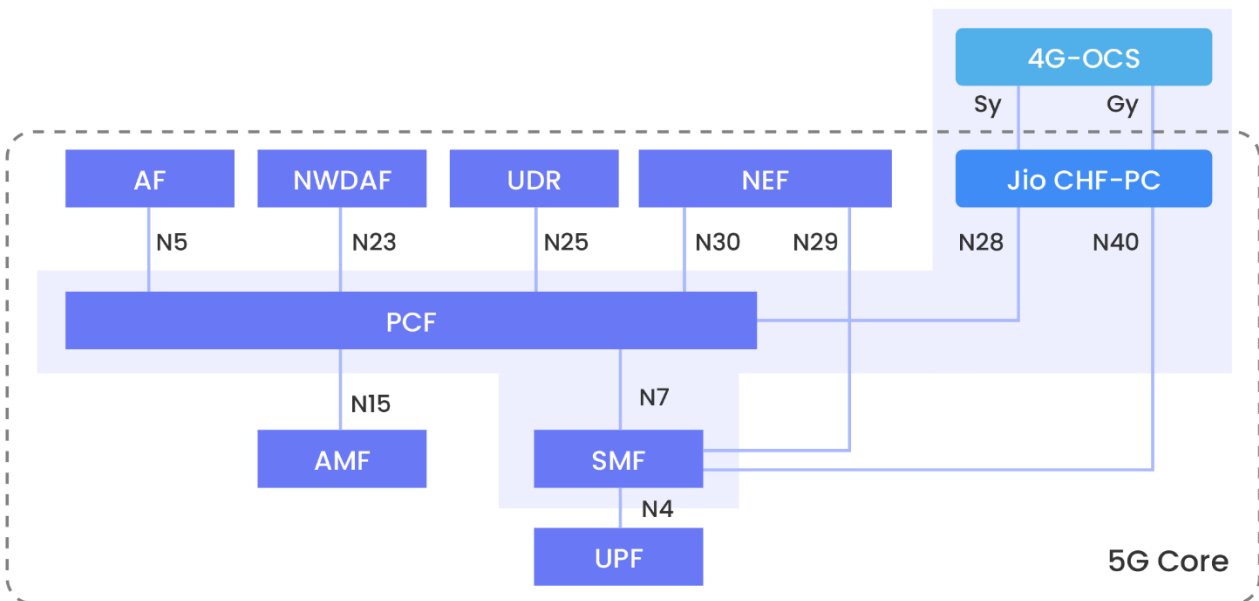
CHF Protocol Converter is a Gateway to 4G OCS for 5G Interface Interactions

3GPP Standard Release16 Compliant

Jio CHF PC resides at the edge of the 4G and 5G networks. It acts as a protocol converter for interactions with the existing 4G network Diameter protocol-based OCS. The solution converts the HTTP/2 messages received from SMF and PCF in 5G network, to diameter messages before forwarding them to OCS and vice versa. Jio CHF PC has a highly scalable cluster which supports conversion for credit control (Gy/N40) and spending limit information (Sy/N28) exchange.

Role of CHF-PC in 5G Core Network

The figure below depicts the 5G core network and the CHF-PC at the edge of the network interacting with the 4G OCS. For the sake of clarity, the CHF is depicted in reference point representation, given that the CHF interacts with PCF and SMF in the 5GC.



Key Features

- Supports both 5G SA and NSA deployments
- High Availability cluster solution with geo redundancy support.
- Ultra-low response time for Diameter and HTTP/2 traffic conversion even under high load condition.
- Automated failure detection and remedial action without any service outage.
- Two-way message conversion without any information loss.
- Provides CDRs (Call Data Records) for Integration with any analytics tool
- Extremely reliable, dynamic, fault tolerant and scalable cluster solution.
- The application instances can be deployed as fully distributed, fully redundant, stateless, and fully scalable NF instance that provides the services from several locations and several execution instances in each location.
- All application components can be deployed as container in any of the standard container orchestration platforms.
- Supports deployment in any private or public cloud environment as virtualised or containerized function.

Key Services Offered

Interaction between PCF and CHF: This service enables the PCF to retrieve policy counter status information per UE from the CHF by subscribing to spending limit reporting (i.e. notifications of policy counter status changes). The interaction includes exchanging information on subscription of spending limits and policy counter status changes. Additionally, it allows cancellation of the subscription to spending limits.

Interactions between SMF and CHF: This service enables online charging functionality by supporting following events.

Converged Charging Create: This service provides means for an NF to request quotas for service delivery or initial report of service usage. It is used for both session and event-based charging.

Converged Charging Update: This service provides means for an NF to update the charging data.

Converged Charging Release: This service provides means for an NF to terminate charging Session. NF Consumer can release the resource of charging session information using this service.

Converged Charging Notify: This service operation provides means for CHF to notify the NF to update or terminate charging of the PDU Session. This service sends notifications to NF consumers of the subscribed events.

Support of CDR for Offline Update and Release Charging Data Request: CDRs are written in ASN.1 format in files on local server and once the record limit per file is reached, a new file is created to write CDR. If FTP is enabled, then CHF will transfer the completed files when record limit is reached to the FTP server.

CHF Integration with NRF: CHF is integrated with NRF for its Registration/ Deregistration, Heart Beat and Profile Updates.

Key Functional Features

- User friendly Command Line Interface
- Embedded Database with CHF
- Robust Element Management System for FCAPs
- Support for N28 interface over HTTP/2
- Support for N40 interface over HTTP/2
- Support for Diameter Sy interface
- Support for Diameter Gy interface
- Initial Spending Limit Retrieval Service Operation
- Intermediate Spending Limit Report Retrieval
- Unsubscribe Spending Limit Report Retrieval
- Spending Limit Notification Service Operation
- Converged Charging Service Operation
- Converged Charging Update Operation
- Converged Charging Release Operation
- CHF Integration with NRF
- Support of Access Token Validation Request with NRF
- Support of CDR for Offline Update and Release Charging Data Request
- On Demand Health Check Dump

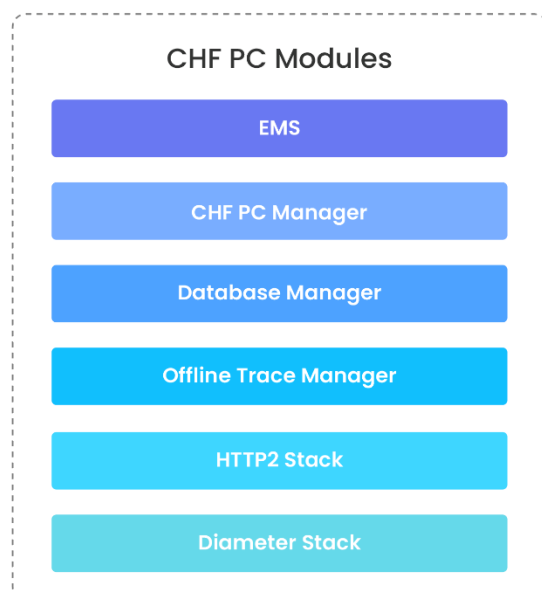
Application Overview

Jio CHF PC comprises of the following modules -

EMS provides a powerful user interface for centralized management of Jio CHF-PC. Some of the key features of EMS includes Performance Management, Fault Management, Backup and Restore, Configuration Management, Management Dashboard etc. Also, EMS can provide more than 1000 customized reports out of the box.

HTTP2 Stack is an RFC 7540 compliant protocol stack developed to support 5G core functions. Jio CHF PC uses the HTTP2 stack for interacting with all the Network Functions.

CHF PC Manager hosts procedures and business logic as per the 3GPP standards. Application Front Ends are completely data-less and stateless. It provides middleware services, which helps the various components of cluster to interact and exchange data and maintain availability of service.





Database Manager acts as an interface for Application Function to connect and fetch data from the database cluster.

Offline Trace Manager assists in tracing a control flow and action taken for a request processing. Jio CHF PC can be integrated with any analytics platform for offline trace management.

Diameter Stack is an RFC 6733 compliant protocol stack developed to support 4G core functions. Jio CHF PC uses Diameter stack for interacting with OCS.

Summary

The Jio CHF PC is a bridge to use the existing OCS in 5GC without support of HTTP/2 at OCS end. It acts as gateway to 4G OCS for any 5G Network Function interacting with OCS. In addition to standard compliant features, the solution provides highly optimized and automated operational procedures. With its virtualized and cloud native architecture, significant saving in time of deployment and maintenance cost can be realized.

Supported 3GPP Interfaces

Interface	Definition	Description
Sy	Diameter Interface with OCS	Interface supports the transfer of spending limit control requests between CHF and OCS.
Gy	Diameter Interface with OCS	Interface supports the transfer of credit limit control requests between CHF and OCS.
N28	HTTP/2 Interface with PCF	Interface supports Spending limit control between PCF and CHF.
N40	HTTP/2 Interface with SMF	Interface supports credit control between SMF and CHF.

Cloud Native Deployment Support

Support for deployment in any private or public cloud environment as virtualized or containerized function (e.g. Google Cloud, Microsoft Azure, Amazon EC2, Openstack, Docker).

Related Products

- Jio Network Repository Function (NRF)
- Jio Network Exposure Function (NEF)
- Jio Network Slice Selection Function (NSSF)
- Jio Access and Mobility Management (AMF)
- Jio Session Management Function (SMF)
- Jio Charging Function (CHF-A)
- Jio Authentication Server Function (AUSF)
- Jio Converged MANO Solution
- Jio Unified Data Management (UDM)
- Jio Unstructured Data Storage Function (UDSF)
- Jio Equipment Identity Register (EIR)
- Jio User Plane Function (UPF)
- Jio Converged IP Short Message Gateway (C-IPSMGW)
- Jio Hybrid Policy Control Solution (H-PCS)
- Jio Element Management System (EMS)
- Jio Adaptive Troubleshooting, Operations & management (ATOM)
- Jio Converged Management & Orchestration Platform(C-MANO)

Hardware Information

The solution can be deployed on variety of hardware including RAC based or chassis-based servers. Below is the list of preferred HW providers.

Dell PowerEdge R640, R740 RACK Servers



HP DL 360 Gen 10 RACK Servers

Dell PowerEdge M1000e Enclosures with MX740/840 Servers



HP ProLiant C7000 Enclosures with BL460 Gen 10 Servers

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