



## STL dPCC



## Seamlessly Monetise Policy & Charging

### Introduction

With changing consumer lifestyles and needs for high speed internet access, interactive value-added services, continuous evolution in networks such as 5G, IoT, 4G/LTE, FTTH, FWA, IMS, etc., and the pressure on CSPs to offer more personalised services such as High Speed Fixed and Mobile Broadband, VoIP, Pay TV and Mobile TV have become mandatory to sustain stiff competition. Customers today prefer to purchase multiple services like voice, video, data, Content Subscriptions (Music, Video, Apps), etc. from a single CSP and require these services to be charged/invoiced in a single consolidated bill.

CSPs are moving towards integrated policy and charging solutions for better control over networks, providing usage flexibility to empower subscribers, increasing revenues, and enabling differentiation through monetisation of policy and charging. Market dynamics compel CSPs to deploy integrated policy and charging solutions allowing them to go beyond traditional network management to increase income and offer better user experience.

dPCC is an intuitive and dynamic policy control and charging platform that offers real-time capability to CSPs. Powered by DevOps, Analytics, Web-scale, Network Software (DAWN), dPCC makes policy enforcement decisions in real-time and charges appropriate rates based on the services, applications, network resources, user profile and service-level agreement to ensure appropriate rating and charging for quality of service and bandwidth allocation.

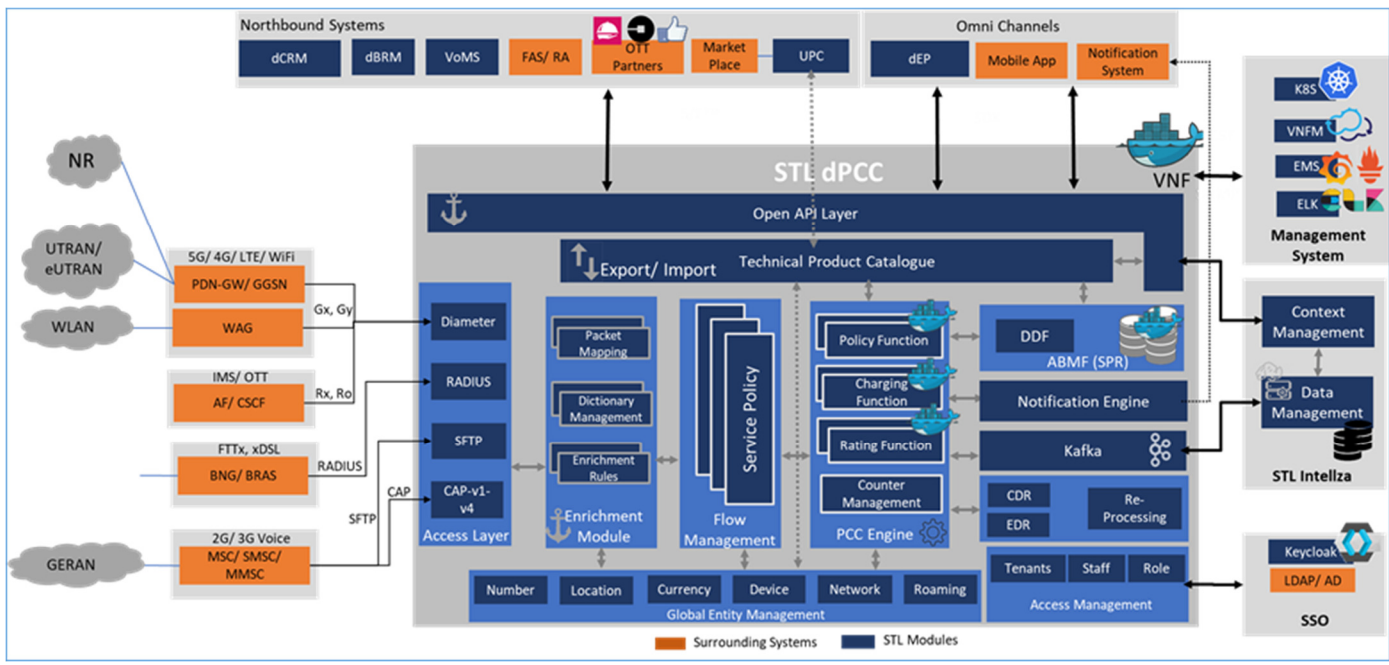
The integrated dPCC enables operators to not just control subscriber entitlement and network resources; it also charges the same with an integrated framework of real-time policy management and charging. By running policy and charging from a common framework, operators can offer innovative, convenient and flexible ways to subscribers to buy and use operator services such as on-demand services, real-time upgrades, service passes and advice-of-charge alerts.

### Key Features

- **Online Charging System:** Online Charging System (OCS) is a highly flexible, scalable, real-time 3GPP release 13 & release 15 5G-NSA compliant engine, which caters to the needs of CSPs providing a wide range of data, content and voice services. It enables CSPs to seamlessly converge Prepaid-Postpaid plans, networks and services. The robust OCS platform can be integrated with legacy IN as well next-generation 5G, IP, FTTH/HFC, wire-line and IoT & other wireless networks. The platform offers system integration with operator's existing PCRF to enable new monetisation use cases. It can be deployed as a standalone module for both Policy and Convergent Charging or as an adjunct solution for real-time charging.

- Policy Designer:** It is a user-friendly, flexible and responsive GUI for faster policy creation. It accepts all major PCC service quality standards and charging parameters. It hides a lot of technical network complexity and allows users to enter only standard input template data in their local language. Single policy designer is enough to handle any number of STL dPCC instances.
- Policy Control:** STL's Policy and Charging Rules Function (PCRF) is a 3GPP R14 & R15-NSA compliant next-gen solution enabling CSPs to deliver service agility, data monetisation and process optimisation. It works in a converged environment with proven interoperability and wide partner ecosystem. The GUI-based flexible architecture has simpler policy creation, high-scalability and is deployable on any COTS hardware – virtualised, on-cloud or in-premise. Aligned with policy 3.0, it takes a relationship-centric approach supporting advanced use cases like congestion control, device/location/usage/ network/APN-wise policy, usage metering, notifications, service-wise quality of service, 5G-eMBB, FWA, VoLTE, top-up plans, multi-tenancy support etc. Solution supports 5G based enhancements, such as support for higher bit-rate (more than 4Gbps) for eMBB (Enhanced Mobile Broadband), Delay-Sensitive-Policy support for URLLC (Ultra Reliable & Low Latency Communication) use cases and high performance in-memory Database to supports 100s of Millions of connections for mMTC (Massive Machine Type Communication).
- Diameter Signaling Control:** Diameter Signaling Controller (DSC) is an intelligent signaling framework that streamlines and routes all diameter-based IP signaling communication within the LTE and IMS networks. It is compliant to IETF RFC 3588, RFC 6733, 3GPP Diameter Routing Agent (DRA) and GSMA Diameter Edge Agent (DEA) guidelines that simplify complex mesh and also improves network performance. The platform does not have any dependency on any external diameter-based load balancer. This will also reduce TCO for the overall solution.

## dPCC Architecture



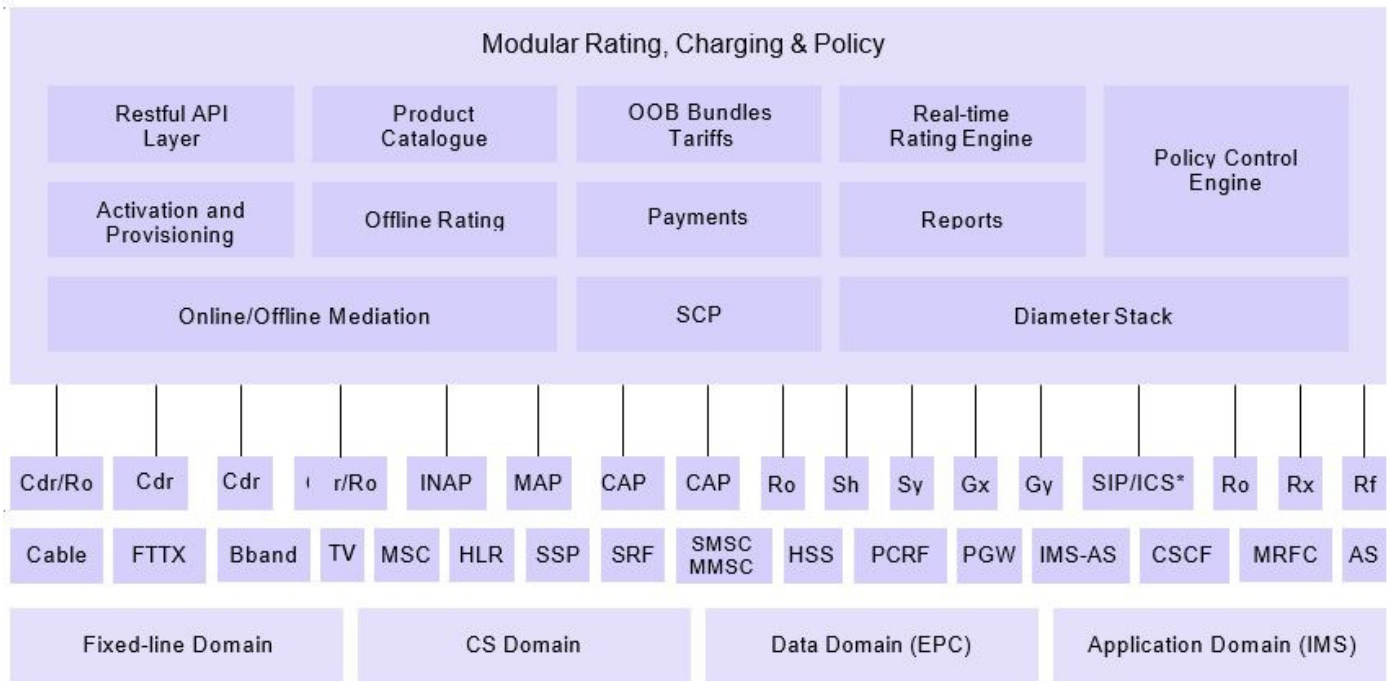


## STL dPCC – Main Modules

- dPCC Engine having Policy Function, Charging Function, Rating Function
- Counter Management
- Access Layer & Enrichment Module
- Subscriber Profile & Policy Repository
- Notification Engine
- Service Policy
- Comprehensive Reports
- Data Distribution Function(DDF)
- Policy Designer
- Open API Layer
- Global Entity Management
- Account Balance Management Function (ABMF)

## Advantages of dPCC

- Proven deployments in Mobility, Wireline & Wi-Fi
- Supports MVNO/E model with data privacy
- Best-in-class TPS support
- Redundancy Support (99.999 % Availability)
- Robust & scalable to N number of policy rules for Policy & Charging Multi-vendor interoperability and supports multiple enforcement points
- Multi-vendor interoperability and supports multiple enforcement points
- Dashboard-based monitoring
- Pluggable PCRF and OCS modules based on license
- Compliance with 3GPP Release 14, IP V6 ETSI TISPAN (RACS), and WiMAX PCC standards
- 3GPP Release 15 compliant for 5G-NSA deployment
- 5G use case support for eMBB, URLLC and mMTC
- eSIM and Multi-Identity Support
- Lowest TCO due to high TPS support
- No dependency on system interface when deployed as PCC which reduce network traffic
- Configurable AVP definition to build any business logic around it.
- Application-specific/URL-specific QoS and quota
- 5G Network Slice based Policy and Charging
- 2 Speed Deployment architecture to support Edge Deployment
- 50+ off-the-shelf Policy & Charging use case support
- Multiple adaptor support with 3GPP Diameter-based Gx, Gy, Gxx, Rx, Ro, DCCA, Sp, Sd, S9, Sy,
- RADIUS support for 802.1X networks, SOAP API, REST, CSV, XML and other proprietary interfaces
- Compatible with Open source Volt-DB Community Edition (CE) 8.4.2
- Multi-services on a single node
- No OEM product involvement which gives full-flexibility to design new solutions (Offers Open Source support)
- Industry standard interface support for interoperability
- Platform/Vendor/Hardware/Network-agnostics product
- Dictionary & GUI-based approach to incorporate any new standard or vendor-specific AVP and build business logic around it even without any patch/upgrade or restart of the application



### dPCC Benefits

- 5G Ready:** STL dPCC is a 5G ready convergent Policy & Charging Solution. With support for Delay-Critical-QoS, Extended-Bit-Rate, 5G-RAT and 3GPP\_5GS, solution can support differential Policy & Charging capabilities for 5G monetization use cases.
- Network Slicing & Edge Support:** STL dPCC supports Network Slicing based Charging and have edge based deployment model, with lightweight collocated DB option for quick and easy deployment at Edge.
- Rating & Charging-based Quota Profile for Data Package:** dPCC Data Package will have user balance and QoS information. The rating & charging-based quota profile contains information of subscribers' profile. So, real-time online charging is also added to policy control in a single box.
- Multi-play Convergence:** The platform supports remaining balance and daily/weekly counters. The Radius and Diameter interfaces on the same subscribers' monetary and non-monetary balance can also be fetched using Rating & Charging quota instance to launch single bucket to multiple services plan. Multiple user identities are supported for common authentication, authorisation and accounting.
- Plug & Play – Policy & Charging:** The platform allows deployment of policy first and charging later or vice versa without impacting each other. It also offers the flexibility to integrate with other PCRF/OCS. The system is a complete access network, network vendor and hardware agnostic.
- Refreshed User Interface:** Server Manager Modules are migrated to Struts 2.3.x and Hibernate 4.3.x providing single UI for server configuration, subscriber management and plan configuration. The new GUI is very flexible, access rights driven and responsive. It hides many network complexities and allows admin to enter/validate standard parameters.
- Agility:** The platform provides various flexibilities like CAL layer, plan configuration GUI, flexible CDR formats, dictionary management, and On-site Creation Capability to shorten the project implementation timeline.
- Onsite Creation Capability:** The platform provides hooks in many places where onsite teams can inject customisation scripts to meet business requirements.
- Open Source Database Support:** The platform is fully compatible with Open Source PostgreSQL 9.6 and EDB Advanced Server 9.6. It also supports industry standard in-memory open source database to support high TPS with horizontal scalability.



- **MVNO/E Support:** The platform provides enhanced multi-tenancy support. Operators can define multiple groups and roles in the dPCC platform and assign group and roles as per relationship with staff. At every level, access rights can be controlled.
- **SPR Account Balance Management Function:** Account Balance Management Function keeps a real-time balance of every wallet of a subscriber. It can also be limited periodically.
- **Compliance with 3GPP Specification 32.299v12 for Diameter Charging Interface:** The platform supports session-based charging. dPCC supports unit reservation credit authorisation model as per RFC 4006. Rating function can handle ratable instances like rating for volume, time and events along with policy/QoS enforcement.
- **VNF Functionality for Dynamically Scaling-out & Scaling-in:** The platform uses REST API for instance creation to support and integrate with any industry standard centralised orchestration.
- **Open Interoperable API Interface:** Server Manager UI and REST API support for configurations like DDF, SPR, roaming, location, alert, Sp Interface, session, ACL group management, staff management, device management, driver management, and system management. The system is fully flexible to integrate with other systems over standard interfaces. The same interfaces are easy to customise and reduce efforts in initial project deployment.
- **Centralised Licensing for Dynamically Configured Instances:** dPCC server instance can be created and configured dynamically. The process of configuring the parameters of the instance is automated. This centralised licensing feature will produce licenses to those dynamically configured instances minimising human intervention. In case of a missing license, dPCC installs one-day temporary license of 10 TPS with full-functional support. This will help in Network Function Virtualisation (NFV).
- **Centralised/Decentralised Session Manager:** Sessions can be managed on a remote server instead of installing server machine. During multiple PCC instances, a centralised session manager avoids CAPEX introduced with multi-session management servers.
- **Multi-dimensional Policy Configuration:** The Policy Rule Engine centrally manages all policies that can be configured based on location, service, subscriber plan, applications, usage history and network details. It further facilitates upgrading/delimiting QoS and also shares it across multiple devices. The platform enables integration with multiple networks & IT systems such as PCEF, SPR, PLM, charging, analytics to deliver policy rules and decisions to be enforced by network elements that enable the creation of monetisation and personalisation use cases. dPCC provides easy plan export/import between configured sites and nodes.
- **Logical Grouping of Servers:** The network architectures are usually complex with servers grouped/distributed to match the geographical needs, lower traffic congestion etc. To streamline the process, STL offers click-through logical grouping functionality, along with easy primary/secondary definitions, swapping and grouping. This simplifies server management and speeds-up reconfigurations.
- **Data Distribution Function (DDF):** The platform enables distribution of subscribers across multiple Subscriber Profile Repositories (SPRs). DDF has improved the upward scalability of the architecture. DDF has enabled the communication between PCC and SPR-based on International Mobile Subscriber Identity (IMSI) or subscriber identity.
- **Counters/Usage Metering:** The platform offers counters or usage metering for major policy decisions based on subscriber usage. It enables service providers to launch plans based on the level of counters that can be metered on daily/weekly/monthly basis. It also enables monitoring and applying data caps based on hierarchy or priority defined in policies. Sy interface supports third-party PCRF and OCS communication.
- **Seamless IEEE 802.1X (Wi-Fi) Support:** The platform supports diameter to communicate with packet core networks and also supports Radius for IEEE 802.1X networks like Wi-Fi, enabling service providers to manage QoS and quota management on standard radius CoA from a single PCC deployment.
- **Integration with Policy Analytics:** It offers an intelligent platform for operators to monitor and analyse usage patterns, revenue patterns, traffic patterns, network performance, subscriber preferences etc. through dashboard-based reports. On integration with dPCC, it enables the operators to modify their existing policies and design and launch innovative policies/plans, which can offer monetising opportunities.



- **Dynamic Service Re-authorisation On-demand:** A successful service delivery requires an integrated framework in the back-end. Dynamic reflection of plans is necessary to enhance customer experience, shortening the delays from purchase to activation of any new plan/service. It is necessary to lower customer churn due to delayed service experience.

dPCC supports real-time re-authorisation during an ongoing session. The service-aware dPCC conveys policy details (reading re-authorisation messages) in real-time to network gateways and policy enforcement endpoints for dynamic reflections.

- **Location-aware Services:** The platform facilitates service providers to roll-out location-aware services especially on Wi-Fi networks wherein the operator's 2G/3G/4G subscribers receive SMS/E-mail notifications on entering the operator Wi-Fi hotspot zone in that location. dPCC does location-wise policy enforcement and charging by identifying various parameters like current location of the user, subscriber profile information, IMEI/IMEISV-based device identification depending on TAC, brand, model, OS, hardware type, year of release etc. and intimates user with customised notifications based on type of device like EAP-SIM, non-EAP SIM etc.
- **Device Management:** The module enables service providers to launch device-specific plans for Blackberry, iPhone, Android etc. dPCC engine identifies the mobile device based on the information available from IMEI/IMEISV like TAC, brand, model, hardware type, operating system etc. On identification of any change of device, notifications are sent to users for plan upgradation or to subscribe for new device plan. Device-specific charging and QoS enforcement are also configurable.
- **Promotional Offers & Add-on Packages:** The platform enables service providers to launch promotional plans and add-on packages, quota profiles and monetise from the same. Such add-on plans can be bundled with the base plans offerings and subscribers are notified for various promotional plans via e-mail/SMS. Different promotional plans can be offered based on the subscriber segmentation wherein specific limit for the plan can also be set. It also supports bandwidth multiplier and quota/volume top-up plan.

- **Reports & Notifications:** The platform provides an interface to service provider for viewing and monitoring Management Information System (MIS) reports. This feature helps in generating details based on every aspect of the system by generating data transfer, bandwidth consumption and active user reports. It helps in the auto-scheduling of report generation and sending it to selected users. These reports can be generated in tabular, graphical and CSV formats.

The platform has Notification Manager module that enables service providers to notify subscriber via SMS, email, push notification and redirects to a specific site/walled garden on the occurrence of specific events/rules such as exceeding quota threshold, roaming or promotions. The service providers can even personalise and configure notification templates for users as per the requirements. Data Distribution Function (DDF): The platform enables distribution of subscribers across multiple Subscriber Profile Repositories (SPRs). DDF has improved the upward scalability of the architecture. DDF has enabled the communication between PCC and SPR-based on International Mobile Subscriber Identity (IMSI) or subscriber identity.

- **Pre-integrated with STL Unified Product Catalog:** Pre-integration with STL Unified Product Catalog (UPC) allows Product Managers to configure, launch and manage all the product offers through a centralized module.
- **Pre-integrated with STL Billing & Subscriber Management Platform:** The pre-integrated platform allows operators to rollout new use cases, more easily and quickly. The end-to-end approach enables operators to derive better value from their new network infrastructure, be it Wireline or Wireless, by reducing the IT complexity associated with the creation and deployment of new services. The single-platform approach mitigates the risk and time delay associated with integrating multiple solutions and helps reduce OPEX by reducing license, support, and maintenance costs. It offers a single, consolidated database across multiple applications enabling a centralised view of the customer and service. A single source for customer and product information fed directly into the policy and charging solution enables the operator to take real-time decisions.



- **Pre-written, Session Look-up APIs for Complex Subscriber Distribution:** With the increasing flexibility in subscriber distribution across repositories, the retrieval of specific subscriber information becomes complex and time-consuming. It requires custom codes to use REST APIs for retrieving subscriber information. Instead, dPCC implements Message Bus style architecture for session look-up API, with pre-written intricate algorithms. This helps to fetch results faster and shows tangible improvements in performance, especially in distributed repositories with complex subscriber segregation. The platform has Notification Manager module that enables service providers to notify subscriber via SMS, email, push notification and redirects to a specific site/walled garden on the occurrence of specific events/rules such as exceeding quota threshold, roaming or promotions. The service providers can even personalise and configure notification templates for users as per the requirements. Data Distribution Function (DDF): The platform enables distribution of subscribers across multiple Subscriber Profile Repositories (SPRs). DDF has improved the upward scalability of the architecture. DDF has enabled the communication between PCC and SPR-based on International Mobile Subscriber Identity (IMSI) or subscriber identity.
- **Attuned to Multiple Hardware Platforms:** The platform enables operators to implement cost-effective network infrastructure, which can scale up to address mobile broadband demand without eroding operator revenue on any COTS-hardware reducing deployment and implementation time. dPCC also supports cloud or virtualised environment-based implementation.
- **Enhanced Audit Support:** Audit report is very crucial for any setup. Enhanced audit support allows an operator to track every change and configuration. The employees of operator/admin can easily view what has been changed.
- **VoLTE & IMS Services Support:** The platform offers separate configuration module to manage IMS-related packages, enabling operators quickly rollout next-generation services such as VoLTE without interrupting existing services. The operators can configure a variety of services that they want to deliver as part of IMS subscription. Solution also supports SPR-Less deployment for VoLTE only PCRF, for cost effective and zero integrations towards Northbound system.
- **Policy-on-edge with Micro-PCC Architecture:** This architecture allows the operators to configure usage metering on Gx interface, which significantly reduces network traffic on charging system for unlimited service or all-you-can-eat offers such as FUP. Policy Control manages free quota reservation and accounting to avoid the calls to online charging system for quota allocation. The charging system is responsible for handling only the calls affecting the monetary balance.




## Key Features

- **Single SPR:** Common subscriber entity. Drastically minimises SPR size
- **Single Gateway Management:** No duplicate gateways configuration. Saves deployment time
- **Common Logs:** Logs stored in single place debugs subscriber's session faster
- **Open API Support:** Common API for PCRF and OCS reduces integration efforts
- **Single Migration:** Saves time and minimise error
- **Synchronised Plan Definition:** Plan synchronisation reduces efforts and errors
- **Onsite Creation Capability:** Enables faster and controlled customisation
- **No Sy for internal communication:** Low message transaction reduces traffic


## dPCC Use Cases

Customer Satisfaction	Plan Personalisation	Less Subscriber Churn	Network Optimisation
<ul style="list-style-type: none"> <li>› Loyalty Bonus</li> <li>› Right Time Customer Rewards</li> <li>› Balance Back</li> <li>› Grace Period</li> <li>› Sponsored Data</li> <li>› Gifting of Unused Quota</li> <li>› Combo Plan</li> <li>› Roll Over/Roll Under</li> <li>› Zero Rated App/URLs</li> <li>› Wall Garden Sites</li> <li>› Prevents Bill Shock</li> </ul>	<ul style="list-style-type: none"> <li>› Roaming Innovative Plan</li> <li>› Shared Data [Family Plan, Shared Devices]</li> <li>› App/URL-based Customised Plan</li> <li>› Time of Day Plan</li> <li>› Free Vouchers by Mall/Partner Brands</li> <li>› Notifications (E-mail, SMS, Push Notification)</li> <li>› Redirection</li> </ul>	<ul style="list-style-type: none"> <li>› Transparent Rating (No Over Usage)</li> <li>› Device Tethering- based Plan</li> <li>› BYOD</li> <li>› Promotional Plan</li> <li>› Real-time Usage Details</li> <li>› CDR Visibility</li> </ul>	<ul style="list-style-type: none"> <li>› FUP/Redirection</li> <li>› Access Network-wise QoS</li> <li>› Video On-demand</li> <li>› Peak/Off-peak Plan</li> <li>› Congestion-based Plan</li> <li>› Blocking/Shaping of Traffic</li> <li>› Promotional Plan based on Cell Site Utilisation</li> <li>› Selective Tariff on Charging System</li> </ul>


## Key Use Cases




**Customer Satisfaction**




**Plan Personalisation**



**Less Subscriber Churn**



**Network Optimisation**



**Disruptive Plan Offering**





## Factors Driving Profitability

- **Early 5G Adaptation**
  - STL dPCC fully supports the most prominent use cases eMBB and FWA for early 5G adaptation. CSPs can leverage the Policy and Charging support for these use cases to launch early 5G services and monetize the same at faster pace.
- **Acquire new customers and reduce existing network cost**
  - Manage Congestion: Prioritise traffic and control data traffic peaks by defining policies such as time of the day and tiered services, which enable dynamic bandwidth throttling once the subscriber reaches the threshold limit, and help operators minimise network congestion.
  - Network Optimisation & Bandwidth Management: Effective use of the platform (defined policies and rules) like mobile data offload will reduce congestion and enable operators to optimise the network usage.
- **Data Service Monetisation**
  - Cross Promotions and Upselling Opportunities: With location-based services and application-based plans. The platform integrates with analytics platform enabling contextual offers and real-time promotions
  - Enables Rollout of New Revenue Models: Operators can offer VAS services such as BoD and VoD through optimum utilisation of network capacity that would have otherwise been left unused. A service provider can also gain monetary benefits through profitable partnerships with M2M device manufactures, OTT providers, content providers etc.
  - Disruptive Plans: It enables the operators to rollout innovative service plans to create a differentiating factor for easy monetisation.
  - Offer Versioning: This feature helps operators in launching varied offers for new subscribers while keeping existing subscribers unaffected.
- **Policy & Charging in a box reduces TCO**
  - Faster Time-to-market: User-friendly GUI and capacity for groovy script enable easy configuration of policies and changes in system parameters, resulting in faster delivery and rollout.
  - Multi-level Overload Protection: Easy management of 5x traffic spikes as compared to threshold capacity without service outage or over capacity hardware.
- **Augmenting Subscriber Satisfaction**
  - Enriching User Experience: On-demand or dynamic service re-authorisation enables operators with real-time service activation or charging or changes or modifications. It helps them to transfer policy details in real-time to network gateways and policy enforcement endpoints for dynamic reflections, leading to enhanced service experience. The real-time balance query also improves the user experience.
  - Multiple Service Offerings: It offers innovative multiple plan associations that enable an operator to offer multiple data plans simultaneously to its subscribers.
  - Real-time Rating & Charging: CSPs can provide both service usage information and per session details. The users can view the charges for specific services they used whenever they need.



### About Sterlite Technologies:

Sterlite Technologies Ltd [BSE: 532374, NSE: STRTECH], is a global technology leader in smarter digital infrastructure. With a pure-play telecom focused business that develops & delivers optical communication products, network & system integration services and OSS/BSS software solutions, Sterlite Tech has sales network in six continents. The Company has manufacturing presence in India, China & Brazil, and aims to transform everyday living by delivering smarter networks. With a strong portfolio of over 130 patents, Sterlite Tech is home to India's only Centre of Excellence for broadband research. Projects undertaken by the company include intrusion-proof smarter data network for the Armed Forces, rural broadband for BharatNet, Smart Cities' development, and establishing high-speed Fibre-to-the-Home (FTTH) networks.



Delivering Smarter Networks

#### Office

Sterlite Technologies Limited  
Block 6, Magnet Corporate Park,  
Nr. Sola Flyover, Thaltej,  
Ahmedabad - 380059 INDIA  
Phone: +91 - 79 - 66065606  
Fax: +91 - 79 - 26407640

[www.sterlitetech.com](http://www.sterlitetech.com)

#### Sales & Marketing

Mumbai	Tel : + 91 - 22 - 61435100	Fax : + 91 - 22 - 61435151
Delhi	Tel : + 91 - 11 - 47540400	Fax : + 91 - 11 - 41589760
Pune	Tel : + 91 - 20 - 67083000	
Dubai	Tel : + 971 - 4 - 204 5391/5390/5392	
Mauritius	Tel : + 230 9481739	

For queries or demo email us : [sales@sterlite.com](mailto:sales@sterlite.com)

