OPENET
An Amdocs Company

# POLICY & CHARGING CONTROL (PCC)

## BUILT FOR DISRUPTION

Microservices-based PCC

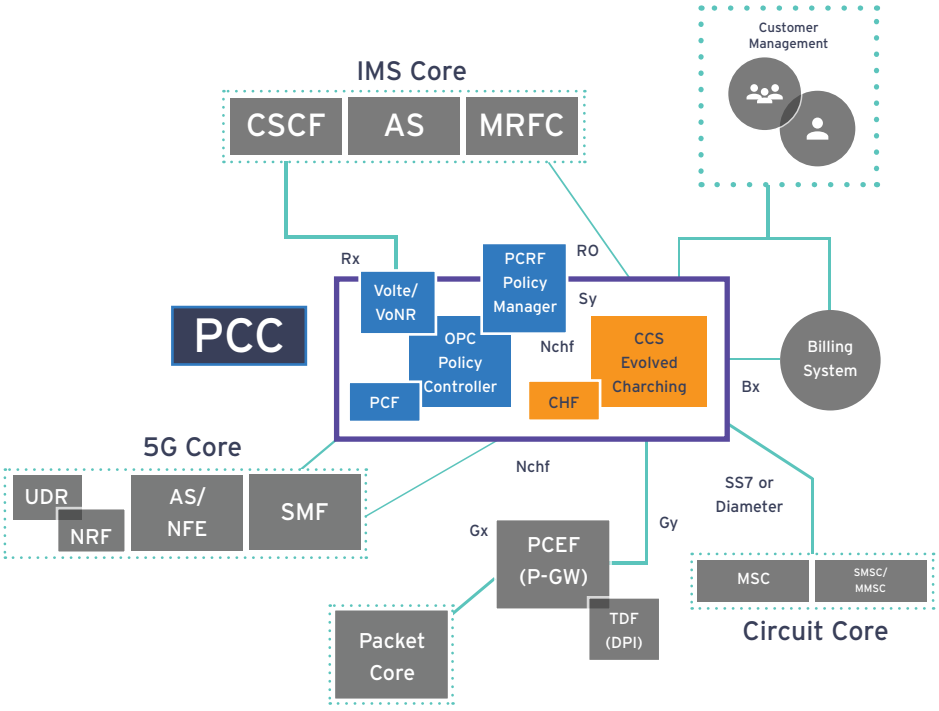
"Openet has built from the ground-up as a set of microservices, where the fundamental principles of a microservice architecture allow for our services to be independently deployable and manageable"

## INTRODUCTION

Policy and Charging have often been considered separately within the operator environment. As new and complementary approaches manifest including DevOps, microservices and Continuous Integration / Continuous Delivery (CI/CD) so too do richer capabilities that break down the traditional approach into more bitesize value. A microservices approach removes the "fork-lift" type of upgrade and introduces an "update" rather than "upgrade" method of evolution. It reduces "shocks" to the rest of the network. Downtime during updates can be removed and it enables new business model benefits that transfer to end-users.

## MODULAR AND MICROSERVICES BASED ARCHITECTURE

Openet Solutions have long been developed in a modular fashion, with modules and components integrated in a flexible manner which allows for multiple deployment scenarios both for multi-phase migration and final architecture. A number of core solutions (i.e. Profile Manager, Balance Manager, Offer Catalog etc.) are common to the entire Openet portfolio, meaning that future expansion and enhancement projects with Openet are simplified. Openet has built from the ground-up as a set of microservices, where the fundamental principles of a microservice architecture allow for our services to be independently deployable and manageable. This separation of the solution into discrete services allows us to provide a higher level of availability through being able to manage the lifecycle of each microservice separately.

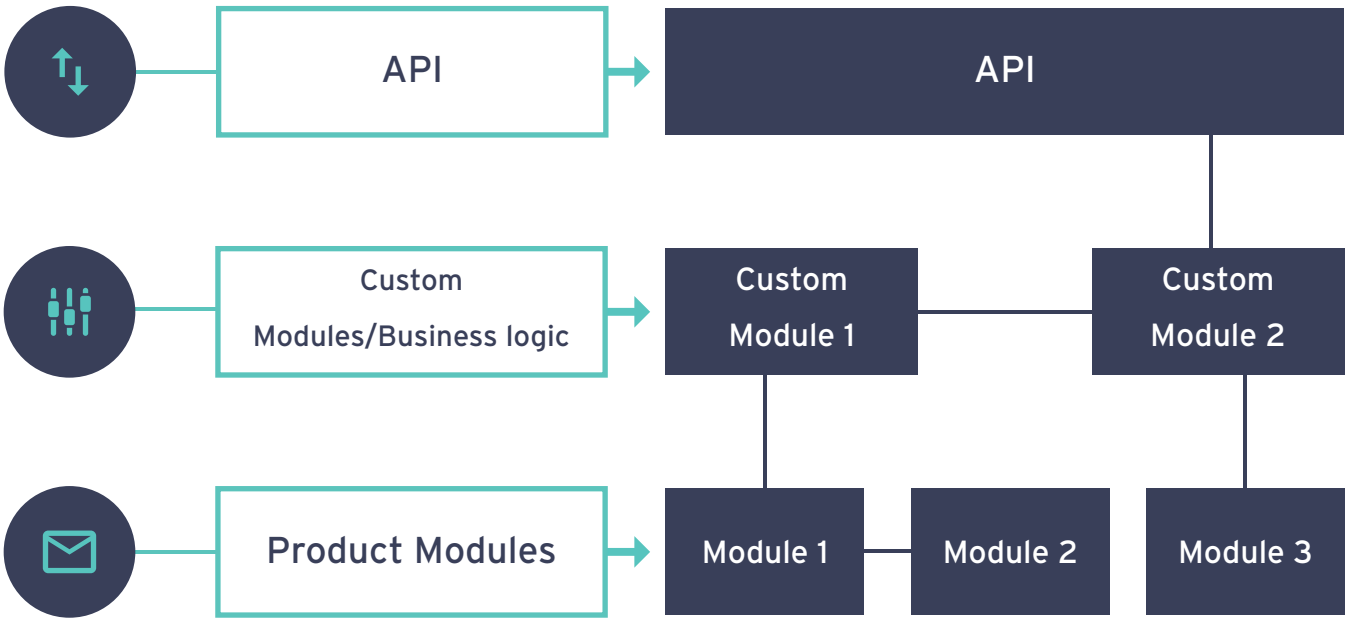



Traditional PCC View and where Policy & Charging sit an Operator Environment

"Any Openet microservice can, in turn, be extended or customised by developing solution-specific business capabilities built by Operators and/or by Openet, depending on the collaboration model employed"

## OPENET MICROSERVICES ARCHITECTURE

All microservices that comprise the overall PCC (Policy + Charging Control) utilise a modular architecture where the functionality of the microservice is delivered through a combination of functional modules. Each core product module has a well-defined internal API that allows it to be seamlessly inserted into the orchestrated flow that comprises the microservice logic.

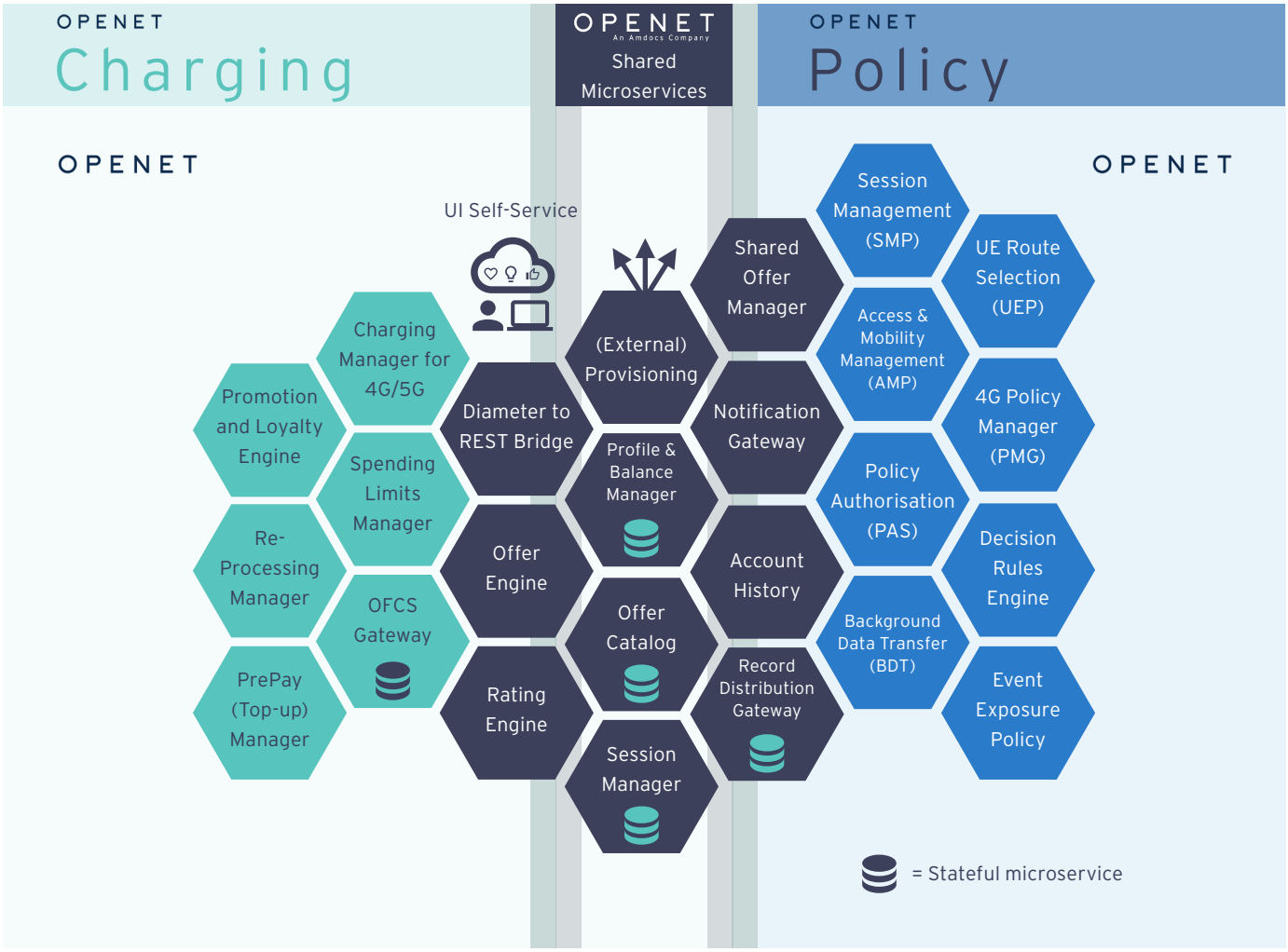



Modular Architecture Principles in an Openet Microservice

Any Openet microservice can, in turn, be extended or customised by developing solution-specific business capabilities built by Operators and/or by Openet, depending on the collaboration model employed. These capabilities can be used to augment an existing core product module, or replace it entirely, and rely heavily on the well-defined internal APIs noted above.

All microservices' external-facing APIs come with definition files following the OpenAPI (www.openapis.org) specification. The API is semantically versioned adhering to these main principles:

- Major version is updated only when incompatible API changes are made
- Minor version updates are done to expose new functionality in a backwards-compatible way
- Patch version is updated for backwards-compatible bug fixes




## STATEFUL VS. STATELESS - AN OVERVIEW

The key difference between stateful and stateless applications is that stateless applications don't "store" data whereas stateful applications require backing storage. Stateful applications like the Cassandra, MongoDB and MySQL databases all require some type of persistent storage that will survive service restarts.

Keeping state is critical to running a stateful application whereas any data that flows via a stateless service is typically transitory and the state is stored only in a separate back-end service like a database.

Any associated storage is typically ephemeral. By definition, stateless services do not need to persist data from session to session. This means they can be replicated on demand, and each replica does not need to be aware of or coordinate with, other replicas.

As organizations adopt containers, they tend to begin with stateless containers as they are more easily adapted to this new type of architecture and better separated from their monolithic application codebase, thus they are more amenable to independent scaling. The efficiency impacts on the network of being able to rapidly scale up as well as down as required are enormous. It's worth emphasising that containers will work in combination with stateful as well as stateless microservices-style applications. i.e. you can also containerise stateful applications.

# OPENET FORGE TOOLKIT

## Forge Overview

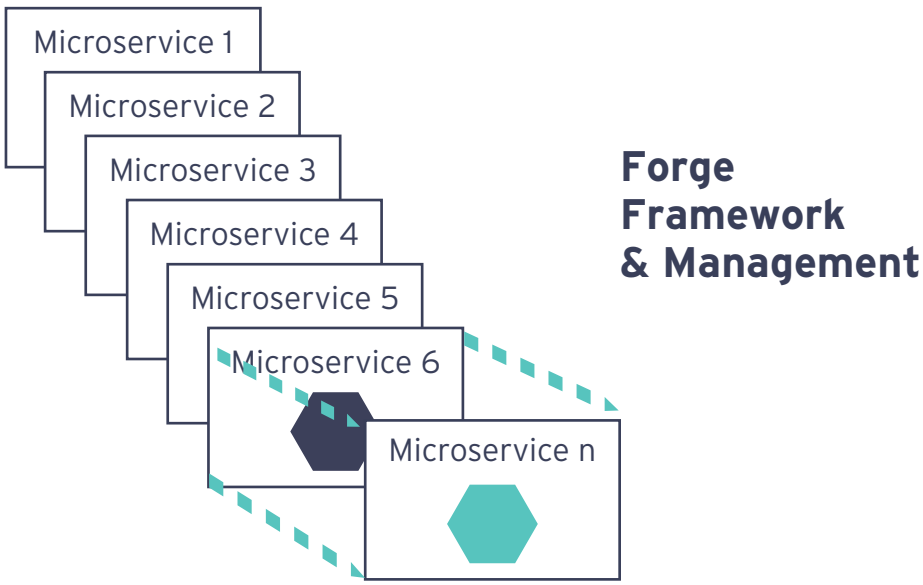
Openet's next-generation development toolkit called Forge enables the development of telco-grade microservices and NFV solutions. Openet Forge is adopting the latest advances in software engineering to create a cloud-based BSS/OSS platform which delivers significant benefits to an Operator. Traditional monolithic BSS/OSS deployments are difficult to scale, and the lack of granular control means generic capability is deployed that may be irrelevant to specific use cases, markets and target customers at any given time.

Openet Forge Toolkit includes:

- Microservices-centric development focus
- A cluster architecture enabling management of distributed systems as a single entity
- A highly distributed in-memory database
- Modular software components (extending on the already modular approach taken in delivering solutions like Openet Charging, but focussed on distributed deployment and independently modular upgradability)
- Enhanced linear and elastic scalability
- Cloud-native deployment support
- Enhanced security and SSO
- CI/CD (deployment pipelines in conjunction with Kubernetes)

Forge provides the continued solidification of the foundation for the move to digital, embracing cloud technology and microservices for needed dynamism, flexibility, and agility. It enables service providers to a position beyond their traditional core business and supports the development of an ecosystem of new capabilities and services-aimed at supporting an operator's desire to grow revenue and deliver long-term opportunity, rapidly linking service needs to business outcomes.

The Openet Forge Toolkit is designed to deploy in the telco-cloud, dynamically scaling to meet demand and instantiating only those components that are needed to support the specific needs of the service at that time. Downtime during updates can be removed and it enables new business



## Forge is the ecosystem and set of tools which allows Openet to deliver microservices to our customers, end-to-end and in the most efficient way.

### Forge Microservices

**Catalog of microservices** to allow for the flexible delivery of the Openet solution portfolio.

Each microservice delivered by Openet is enabled by Forge.

### Forge Framework

**Next generation framework** for the development of telco grade microservices based solutions:

- Modular Architecture
- Cloud Native
- Enhanced security and SSO
- Microservices enabled

### Forge Management

**Operations, maintenance and toolset** to allow for the efficient management of a solution:

- Kubernetes and Docker support
- Unified Monitoring

## OPENET MICROSERVICES ARCHITECTURE

Openet's Digital Platforms can be used to provide a low risk, pre-integrated stack. As it is a modular stack, service providers only need to take the solutions they want and the API driven approach means Openet can integrate with any existing systems that the service provider has in place.

**Tier 1 service providers:** for many large service providers who are undergoing a lengthy (and expensive BSS/ OSS digital transformation) the Openet Digital Platforms can provide a plan B. It can be quickly implemented in parallel to the existing legacy stack in order to enable the service provider to increase revenues from digital services and enable personalised customer engagement.

**Tier 2 and 3 service providers, Digital First Sub brands and MVNx:** Openet's Digital Platforms provide the low-risk solution to get an end to end Digital stack up and running.

Furthermore, Openet service capsules ensure rapid rollout at the scale of fit for purpose functionality at a cost point that makes it affordable for IoT and enterprise audiences.

Offering complete flexibility, Openet's Digital Platforms can be supplied direct from Openet or via our System Integration partners. They can be delivered on-premise or in the cloud and fully managed 'As a Service'.

## ABOUT OPENET:

Openet, an Amdocs company, is a leading software and services provider to communications companies. Our deep domain expertise & understanding of complex systems, underpinned by the tenacity and determination of our people, enable us to radically transform how our customers do business, providing best in class digital and 5G business support systems.

In an industry where the only constant is change, our open and innovative technology is built for change. For the last 20 years we have helped the world's most innovative communications companies manage and monetise their business and evolve from communications companies to digital service providers. This gives our customers the power to enter new markets, open new revenue streams and increase profitability.

**Openet. Built for Change**

**www.openet.com**

## OPENET PRODUCTS:

**Openet Charging:**
Real-time convergent charging for digital and 5G services.

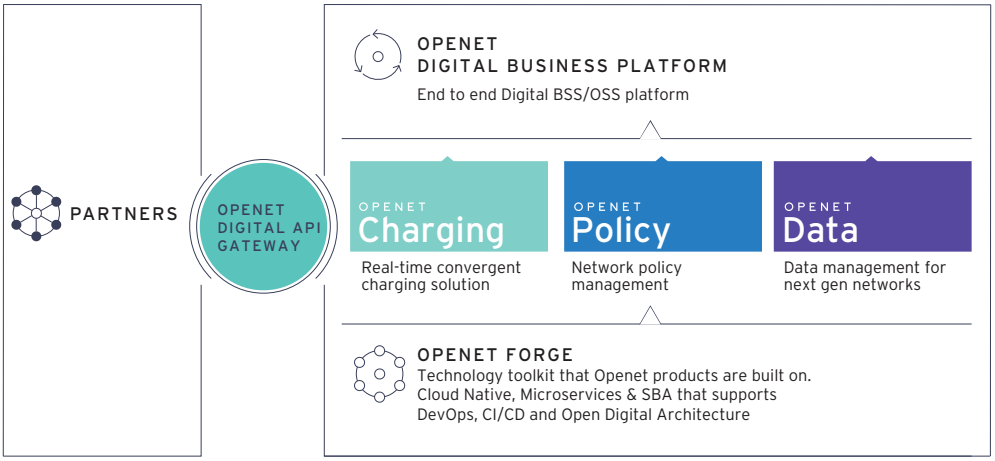
**Openet Policy:**
Network policy control for next gen fixed, mobile and converged networks.

**Openet Data:**
Data management, data processing and data governance solution designed to collect and manage data at 5G volumes in real-time.

**Openet Digital Platform:**
End to end Digital BSS/OSS stack containing Openet & our partners' products.

**Openet Forge:**
The digital enablement toolkit which contains Openet's library of microservices, upon which all Openet products are built.

## OPENET PORTFOLIO




## DELIVERING BUSINESS VALUE:

RESULTS REALISED BY OPENET CUSTOMERS

**40%**
Reduction in time to market for new offer creation

**28%**
Uplift in offer uptake

**11%**
Increase in mobile data ARPU

**41%**
Increase in mobile data revenues

OPENET
An Amdocs Company

BUILT FOR CHANGE

### OUR CUSTOMERS

AT&T · Bell · BT · Claro · Globe · Magenta · OPTUS · orange · Singtel · SoftBank · T-Mobile · Telia · TELKOMSEL · vodafone

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