MDS GLOBAL

CMP 8.19

CMP Overview

Version 1.0

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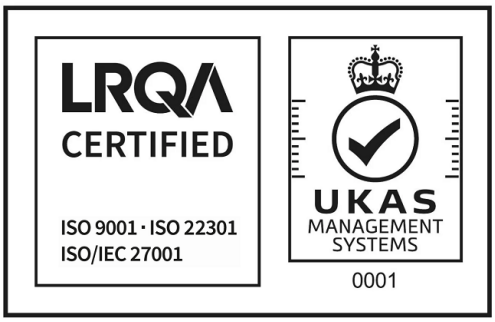

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Version Control

Version	Issue Date	Author	Comments
Version 1.0	02 July 2025	MDS	CMP 8.19 Release - Updated the business configuration and product catalogue to include the new configuration functionality that allows users to add, edit, and view additional CMP configuration data.

Terms Used in this Document

For definitions and explanations of the terms, abbreviations and acronyms used in this document, please see the *CMP Glossary* document.

1.0 About This Document

This document includes a high-level description of the functional blocks of the system, and how they interact together to provide CMP functionality. It also provides a high-level overview of the technical architecture of the system and describes the optional components that CMP can provide.

This document provides overview-level detail and as such does not contain any software deployment information and does not show individual screens or detailed user processes.

2.0 Introduction to CMP

The MDS Global Converged Monetisation Platform (CMP) supports convergent rating, billing and end-to-end customer management for digital service providers. CMP manages the full customer lifecycle and creates a unified view of the customer supported by a single database. The integrated Product Catalogue supports any type of subscriber-based product, including mobile, fixed line, and IP TV. Through a hierarchical structure, CMP handles customers - from individual consumers to complex corporate or Internet-of-Things (IoT) structures in the same environment via the same user interface and/or APIs.

CMP is:

- Convergent

  CMP was designed from the outset to allow the configuration of multiple networks in a single environment. Each network represents the service operator, for example a mobile network operator, a fixed line carrier, or an on-demand media provider.

  A single subscriber can have subscriptions to many different networks and have the charges for each combined in a single bill.

  For business and corporate organisations, CMP can produce bills to reflect the structure of that organisation for example by organisational unit or cost centre.

- Flexible

  CMP is designed to allow service providers to administer their own business policy changes - for example, new price plans - through an intuitive web-based UI. This allows service providers to react quickly to changes in their operating markets.

- Modular

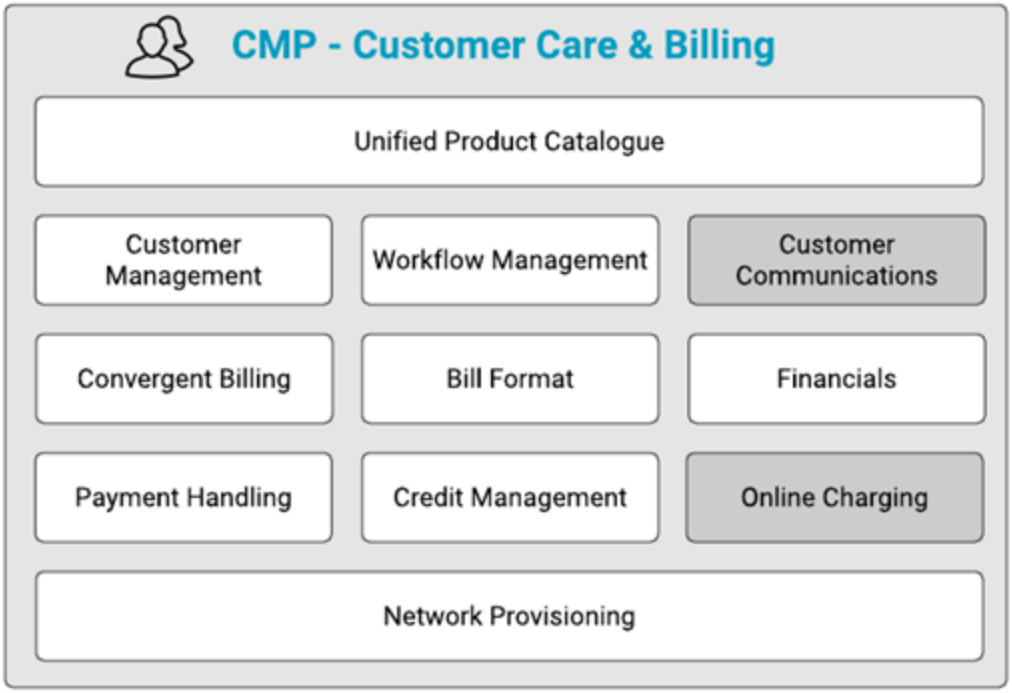
  CMP has modules for Subscriber Registration, Workflow Management, Payment Management, Service Activation, Billing, and Credit Management, amongst others.

  Each module is designed to be highly configurable and integrates with many third party providers.

3.0 CMP Functional Overview

3. 1 CMP Core Components

This section provides an overview of the key areas of CMP and the individual components of each functional area:



CMP Core Components[1]

3. 1. 1 Customer Management

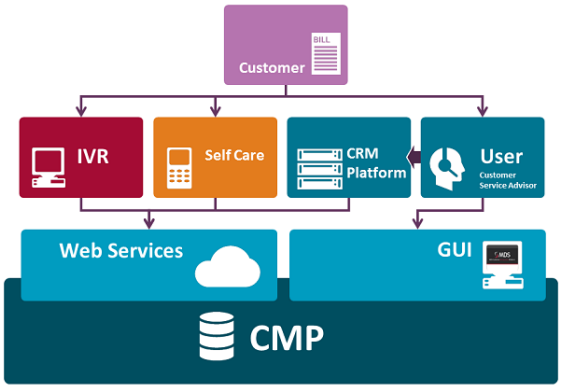
CMP has two customer management interfaces:

- AgentView – allows registered users to view and administer all customer details using a complete interactive user interface.
- CMP web services – an open Application Programming Interface (API) to allow third party Customer Relations Management (CRM) and self-care applications to query

[1]The grey areas in the Core Components diagram are options.

and update customer details.

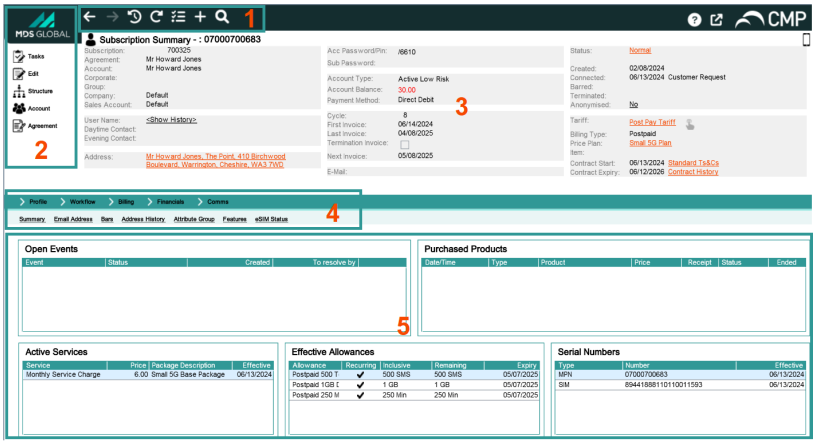
For more information, see "Integration Overview" on page 36.



3.1.1.1 AgentView

AgentView is a web client that provides a complete view of the customer with all the information relating to Orders, Billing, Payment and Provisioning accessible in a single UI, connected to a single database.

Users can access customer details via a flexible search facility using a range of options to identify the customer. The GUI provides a consistent look and feel to the displayed data, to enable consistent navigation between all levels of the customer hierarchy.



AgentView Overview

1. **Toolbar** - provides access to general CMP features not related to the context of a customer, including the **Search** and add **New Customer** features.
2. **Navigation menu** – supports navigation around a customer structure.
3. **Summary** – displays summary information relevant to the entity of a customer structure currently being viewed.
4. **Menu bar** – changes the context of the lower panel to display customer specific details.

5. **Customer details panel** – displays customer details based on the option selected in the menu bar. Default view is the profile summary, which gives an overview of the key features of the entity being viewed.

3.1.1.2 Accuracy Tools

Address Lookup

CMP integrates with external address lookup solutions, such as QAS from Experian, to look up address details. Users enter a house number and postcode in AgentView, which then uses those details to query the third party provider, and presents the returned address to the user for selection.

Bank Account Validation

CMP can validate bank account details when setting up or amending a direct debit instruction, both through AgentView and from an external platform via web services.

Invalid bank details returned by either method are not accepted into CMP, reducing the volume of unsuccessful new or changed instructions.

3. 1. 2 Workflow Management

Many of the functional areas within CMP use **Workflow Events**.

Workflow Events drive and record activity within CMP. Every Workflow Event has a unique reference number to enable an audit trail.

Workflow Events can be added at different levels within the customer hierarchy and can be reported upon as required.

Workflow Events can be initiated automatically as a result of system driven activity, or manually to record or instigate activity against a customer, for example:

- Log customer calls and correspondence
- Produce communications
- Produce one-off invoices and credit notes
- Communicate with a network provider to request actions such as connecting or disconnecting a device
- Automate procedures, for example, Credit Control and Payment Management.

Workflow Events are typically aligned to the business processes of the service provider.

Workflow Events are categorised by a **Type** and identified by a **Code**:

- Workflow Event Types are used to represent various categories of events or departments, for example **Credit Control**, **Customer Service** or **Provisioning**.

- Workflow Event Codes are allocated within each event type to represent events or procedures within the business, for example **Credit control bar**, **Credit control disconnect**.

Each Workflow Event Code can be configured with different **Actions** attached that minimise the amount of manual intervention involved in managing the customer and/or business procedure:

- A Workflow Event requiring no user interaction that has a defined purpose or Action can be configured to automatically process through to resolution.
- Other Workflow Events, which may require user interaction, can be configured to start in an **Open** status before being manually processed, once any required information is captured.

Resolution of a Workflow Event can trigger another Workflow Event to be created, supporting the execution of business processes.

3.1.2.1 Workflow Event Actions

Workflow Event Actions are grouped into standard Action Types:

- **Network Actions** – sends commands to the network, for example connections or bars.
- **Account Type Movements** – automatically transfers an Account from one Account Type to another.
- **Subscription Services** – applies a service to a Subscription, for example, Line Charge, Itemised Billing, Direct Debit Fee, or Insurance.

The first Action Type relates to network activities. The second two Action Types relate to system activities.

Each Action is issued its own sequence number when added to a Workflow Event. CMP attempts to process Actions in sequential order.

A background process runs continuously to identify new Actions to be processed. Those requiring transmission to an external party, such as a network, are handed off to the appropriate interface. Updates are recorded in CMP when a response is received.

When a Workflow Event is processed, any unprocessed Actions are also processed and recorded as **Actioned Items**.

The Actioned Items feature provides a list of all Actions linked to a Workflow Event with details of both Network and Non-Network Actions, confirming which have been successfully processed and which have not.

Actions that fail to process present an error from one of two categories to the CMP user:

Processing Error

Checks are performed when a Workflow Eventis processed to validate the request being made is allowed.

- If these checks fail, the Action is given a **Processing Error** status and a meaningful description is presented.
- Examples of processing errors include trying to connect an already connected subscription or trying to remove a bar that has not been applied.

Confirmation Errors

Confirmation errors are used to handle rejection responses from independent processes or third parties.

- Examples include failed connectionsand failed number changes.

3.1.2.2 Worklists

Worklists are queues of Workflow Events that require user intervention. The events typically have a status of **Open** or **Error**. A Workflow Event can be configured to automatically fall into a defined Worklist, or will otherwise default to the queue of the person or process that generated it.

Workflow Events can be passed between Worklists. A user can assign a Workflow Event from a team Worklist to their own Worklist to perform the required task.

Workflow Events with a **Closed** status are not shown in Worklists but can be retrieved for auditing purposes via **Search**.

3.1.2.3 Tasks

The **Tasks** feature is a process-focused entry point to creating Workflow Events. Tasks represent a list of common business processes executed by users. The feature allows task-specific fields to be defined to support users in capturing the correct information when initiating a process.

3. 1. 3 Bulk Action

The CMP Bulk Action module allows users to apply bulk changes to CMP entities, for example editing subscriptions. To perform a bulk action, users provide Excel templates that contain the data to be applied to the entities. CMP converts the Excel file into a CSV file, which is then processed by a batch job.

Users can upload templates and initiate bulk action jobs in the CMP Bulk Action console.

In the console, users can also:

- View details of previous bulk actions that have been performed
- Drill down into an individual bulk action's details
- Drill down into workflow error details for bulk actions associated with an asynchronous workflow
- Download reports for a bulk action
- Generate reports

See the *Bulk Action Console online help* for more information on using the console. See CMP Batch Jobs and JSON Schemas for more information on Bulk Action jobs.

3. 1. 4 Hardware Orders

CMP supports hardware purchases - such as handsets, peripherals and software licences at the account level.

Orders can be taken via AgentView and are processed as follows:

1. New order status - An order has been entered in AgentView, but not yet generated. Once it has been created, you can add items to the order. At this point, if that particular deployment of CMP is connected to a warehouse, a CSA can perform a stock check to see if the desired hardware is in stock. A stock check can also be performed independent of an order.
2. Awaiting Generation status - The CSA has generated the order. This triggers the Sales Order Request job, which produces a JSON file with details of the order to send to the relevant warehouse(s).

   At this point, if required, the Sales Order Request job can request a fraud check, to validate the delivery name and address. The outbound JSON contains a fraud check flag. If this is set, a fraud check is performed before the file is sent to the warehouse. If it is successful, the JSON is sent to the warehouse.
3. Awaiting Dispatch status - Once the order has been sent to the warehouse, the status of the order is Awaiting Dispatch. The warehouse completes the order and dispatches it to the customer. The warehouse produces a file with details or successful orders and any errors and returns it to CMP. An adaptor picks up the file and converts it to JSON format. The Sales Order Dispatch job processes the batch and updates CMP. The customer will be billed for the order where appropriate.
4. Complete status - If the response file from the supplier contains a record of a successful dispatch, the order status is complete. If there was an issue with the order, the status is Error.

Customers can be billed immediately on completion of an order or the charge can be applied against the next invoice of their regular billing cycle.

Customers can also request device enrolment[1] for an order. Device enrolment is handled by the Device Enrolment Request and Device Enrolment Response jobs. The jobs prepare and send batches of device enrolment instructions to device manufacturers and process their responses. They also handle device unenrolment requests.

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[1] A Device Enrolment Program (DEP) is where a manufacturer or supplier can pre-provision a device with settings that, for example, enforce an organisation's device management policy. This can include encryption, passwords, apps and bars on premium calls, for example.

3. 1. 5 Convergent Billing

The CMP convergent billing engine can calculate and consolidate all chargeable events, mobile, fixed line, and/or broadband related services onto a single customer bill.

CMP handles a number of different charge types, which cater for most types of service:

- **One-off charges**

  Any one-off charge to be billed to the customer. These can be applied at any level of the customer hierarchy.

  One-off charges are normally for one-off bolt-on purchases or in response to a specific event, such as fees associated with connection or termination. These can be applied manually by a CMP user, a customer using a self-care portal or as an automatic **Action** associated with a **Workflow Event**.

- **Periodic charges**

  Recurring charges covering a configurable period. Periodic charges can be billed in advance or arrears. Charges for partial periods can be pro-rated. These charges can be applied at any level of the customer hierarchy.

  - Periodic charges are normally a regularly recurring charge associated with the subscription, such as line rental.
  - Pro-rated charges are calculated based on an average 30.4 days in the month, or on the exact number of days in a month.

- **Unit-based charges**

  Driven by xDRs, unit charges can be usage or event based. These are typically sourced from a third party such as a network using a secure gateway. The charge is determined by online rating, or can be passed directly to the bill by the third party, see *Charge Loader* for more information. These charges are always generated at the Subscription level. Unit-based charges can be affected by allowances and discounts and are always billed in arrears.

- **Adjustments**

  A mechanism to apply an ad hoc credit or charge to an account. Adjustments provide the functionality to apply a goodwill credit or reverse an incorrect charge from a previous bill. Adjustments are raised at the Account, Corporate or Group levels, and can form part of the next cyclical bill or be applied independently to trigger a credit note. Adjustments are manually applied by CMP users within AgentView or by third party systems using CMP web services.

The applicable tax is applied to calculated charges, and billing data is output in the JSON file produced by the Bill Print batch job for online display and paper bills to be produced by a third party print vendor.

The CMP Agreement determines the eligibility for billing in each invoice production run. The billing task itself is wrapped by pre- and post-bill assurance processes to minimise the risk and impact of billing errors.

3.1.5.1 Billing controls

The Agreement entity of the CMP customer hierarchy contains the controls for the frequency, structure and content of customer bills.

Key features are the following:

- **Bill Cycle**

  The day of the month when cyclical bills are triggered. This can be configured as any day between 1 - 31 days. See also **Next Expected Invoice Date**.
- **Invoice Frequency**

  The number of days or months between bills.
- **Next Expected Invoice Date**

  This is the date the Agreement becomes eligible for invoicing, and is a key factor in the selection criteria used by CMP to determine when to generate a bill for a subscriber. Each time the subscriber is billed, the bill cycle and invoice frequency are used to set the Next Expected Invoice Date to the appropriate future date. CMP automatically adjusts for short months.
- **Consolidation Level**

  The level of the hierarchy at which charges should be grouped for billing. This ultimately determines how many bills are produced for the subscriber and where the debt sits on the customer hierarchy.
- **Billing Media**

  The media and format of the bills produced, for example e-billing, Braille or audio.
- **First/Final invoice controls**

  Govern when first and final bills are produced, either on the normal bill cycle, or a configurable number of days after connection or disconnection.

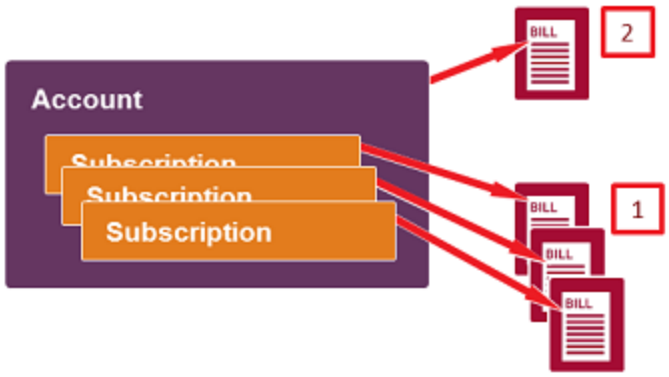
3.1.5.2 Consolidation

Agreements can be logged at Account level or higher on the CMP customer hierarchy. The level at which the agreement is logged determines the options available for consolidating charges into bills:

3.1.5.3 Account Level

Agreements logged at Account level can have Subscription-level or Account-level consolidation.

1. Subscription-level consolidation results in individual bills for each Subscription linked to the Agreement.
2. Account-level consolidation results in a single bill containing the charges for all Subscriptions below that Account entity that are linked to the Agreement.

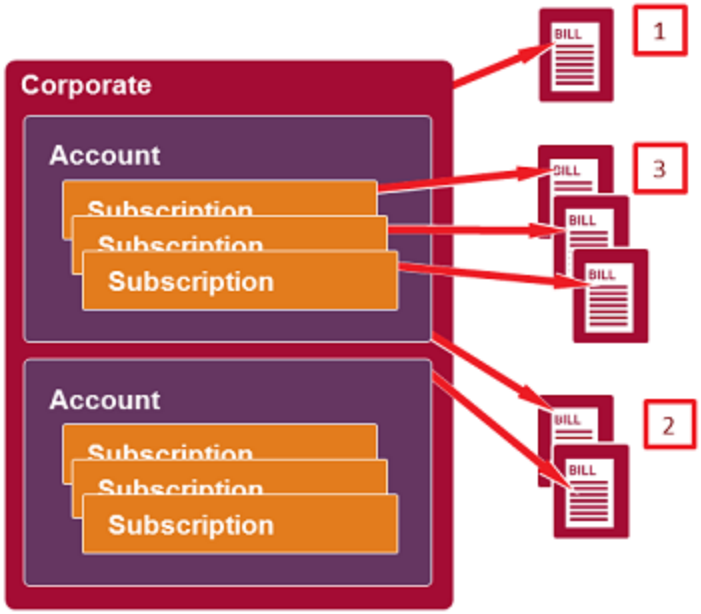


Account Level Logging

3.1.5.4 Corporate level

Agreements logged at Corporate level can have Subscription-level, Account-level, or Corporate-level consolidation.

1. Corporate-level consolidation results in a single bill containing the charges for all Subscriptions below that Corporate entity that are linked to the Agreement.
2. Account-level consolidation results in separate bills for each Account below the Corporate entity that has Subscriptions linked to the Agreement.
3. Subscription-level consolidation results in individual bills for each Subscription linked to the Agreement.

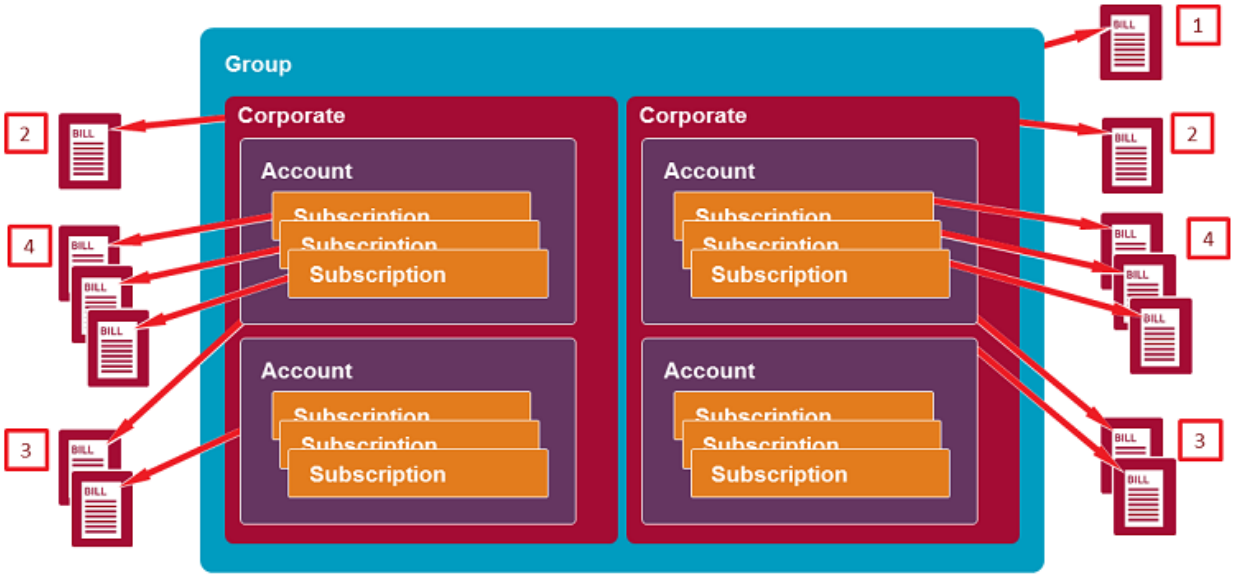


Corporate Level Logging

3.1.5.5 Group level

Agreements logged at Group level can have consolidation at the Subscription, Account, Corporate, or Group level.

1. Group-level consolidation results in a single bill containing the charges for all Subscriptions below that Group entity that are linked to the Agreement.
2. Corporate-level consolidation results in separate bills for each Corporate below the Group entity that has Subscriptions linked to the Agreement.
3. Account-level consolidation results in separate bills for each Account below the Corporate entity that has Subscriptions linked to the Agreement.
4. Subscription-level consolidation results in individual bills for each Subscription linked to the Agreement.



Group Level Logging

3.1.5.6 Tax Calculation

CMP calculates the tax due in line with the tax requirements of national regulators through configurable **Service Tax Codes**.

Each billable **Service** has an associated **Tax Code** reflecting the applicable rate. Where charges exist against multiple tax rates on a single bill, a tax line for each tax rate will be output in the Bill Print JSON file.

CMP supports, but not limited to, the following tax concepts:

- **Inclusive Tax**

  Prices are configured in CMP as the VAT inclusive amount. During Invoice Production tax is split out totalled against the configured Inclusive Service Tax Code.
- **Exclusive Tax**

  Prices are configured in CMP exclusive of tax. During Invoice Production tax is calculated, applied and totalled against the configured Exclusive Service Tax Code.
- **Exempt Tax**

  If defined as Tax Exempt, no tax will be applied.
- **Reverse Charge**

  If an Account is flagged as eligible for reverse charge taxation, CMP does not calculate and apply tax for that customer. Reverse charge tax must be declared to the appropriate revenue and customs authority. The service provider (seller) must include an acceptable method of notification on an invoice provided to the customer (buyer) stating the amount of tax to be paid. Reverse Charge VAT applies to:
  - business sales where the business is VAT registered
  - goods purchased for a business purpose
  - mobile phones and computer chips

    The invoice must also come to a total of at least £5000 (ex-VAT).

Override Tax at Account

A **Service Tax Code** can be configured against a CMP Account in the Sales Ledger. When the **Override Tax Code to A/C** flag against the Account is set, the configured Service Tax Code is used to tax all Usage and Non-Usage items related to that Account.

3.1.5.7 Invoice Production and Print

Customer billing is typically generated daily but can be scheduled according to operational requirements. The one-off, periodic and unit-based charges are collated for each Subscriber deemed eligible for billing, based on their calculated **Next Expected Invoice Date**.

Charges and Credits are applied based on a CMP Service code. The behaviour of each Service Code is driven by underlying configuration during billing. A recurring service can be configured to charge in advance or in arrears and to prorate when applied or expired. Service configuration also drives how the associated revenue is reported in the ledgers and the tax rate applied to the charge. Tax is calculated against the sum of all charges for a tax code. CMP handles Inclusive, Exclusive, Exempt and Account Override for tax.

CMP collates charges for usage and events against services. It maps each usage classification to a Unit type service, which groups charges on the bill.

CMP creates invoice lines based on the chosen consolidation level where charges or credits exist.

CMP creates invoice lines based on Services for any identified non-agreement driven charges such as adjustments.

Once all invoices have been generated, they are posted to the sales ledger and the billing file is generated. This can then be transmitted to a print bureau.

3.1.5.8 Bill Formatting

The billing files, generated by the Invoice Print process, are used to generate the physical and/or electronic bills that are sent out to end customers and made available through the self-care applications and AgentView.

At the end of the billing process, the billing file is automatically transferred to the Bill Formatting system that is responsible for the generation of the PDF bill for distribution and enquiry.

3. 1. 6 Financials

3.1.6.1 Sales Ledger

CMP's in-built ledger is used to track all relevant financial transactions, maintaining sales ledger entries for all relevant CMP activities.

For instance, at billing, all invoices generated will create entries into the Sales Ledger. Data is made available via web services or extract files as detailed in the *Extracts Guide*.

3. 1. 7 Payments

CMP allows recurring and ad hoc payments to be made to clear or reduce their outstanding **Balance**, as well as pre-pay recurring purchases

CMP supports recurring direct debit payments including Bankers Automated Clearing Services (BACS), recurring and one-off debit or credit card payments, bulk one-off payments, and refunds. Payments can also be provided from third parties such as debt recovery agencies and banks using CMP's Generic Payment Upload facility.

Payments can be made directly from AgentView as well as via CMP web services through third party applications such as sales order portals, self-care applications, and Integrated Voice Recognition (IVR).

Note: Full details of recurring payments can be found in the *Payments Functionality Guide*.

3.1.7.1 Recurring Payments

CMP can automatically collect payments when a customer's bill becomes due through the following schemes:

3.1.7.2 Direct Debit

A direct debit is an instruction from a customer (debtor) to their bank or payment services provider, authorising an organisation (creditor) to collect variable or fixed amounts from their account, as long as the customer is given advance notice of the collection amounts and dates. Payments are collected directly from a subscriber's bank account. In CMP, direct debits are handled as followed:

- The CMP direct debit extract routine determines direct debit paying customers with payments due and unprocessed direct debit refund requests.
- Direct debit extracts are transmitted to BACS via a third party payment handler for processing.
- Payments are posted to the Sales Ledger in CMP immediately when direct debit extracts are transmitted, assuming success of the payment, with a calculated posting date resembling when the customer's bank account will be debited or credited.

CMP generates and automatically processes a number of files to manage direct debit payments:

- Mandate Registrations – Transmission of new Direct Debit instructions
- Mandate Revisions – Reception of rejected, amended or cancelled Direct Debit instructions
- Recurring Payments – Transmission of payment and refund transactions that are due for settlement based on the account's payment method and financial activity
- Recurring Payment Rejections – Reception of recurring payment transactions that have been rejected due to insufficient funds or other reasons.

3.1.7.3 Recurring Authority Card Payments

Recurring payments taken automatically from a subscriber's credit or debit card.

The due date of a bill is based on the Payment Terms associated with the account at the time the bill is produced, for example a bill produced on the 10th of a month with 14 day payment terms becomes due on the 24th.

With each recurring payment scheme, payment failures are handled to initiate appropriate follow-up activity, such as retries and subscriber communication. When a payment request has failed (including any retries), the subscriber is eligible to enter Credit Control.

The due date of a bill is based on the **Payment Terms** associated with the account at the time the bill is produced, for example a bill produced on the 10th of a month with 14-day payment term would become due on 24th.

With each recurring payment scheme, payment failures are handled to initiate appropriate follow-up activity, such as retries and customer communication. When a payment request has failed (including any retries), the subscriber is eligible to enter Credit Control.

3.1.7.4 One-off Payments

One-off payments are made by CMP users on behalf of customers calling the contact centre via AgentView. One-off payments can also be made via third party self-care applications and interactive voice response systems (IVR) using CMP web service.

One-off payments can be made using an existing or new credit or debit card or via batch CMP functionality:

- New or existing one-off authority card payments - The CMP Add Payment wizard redirects credit and debit card payments through an a third party payment service to support PCI DSS compliance:
  - The one-off payment **Amount** is entered in CMP.
  - The CMP user is redirected to a web page hosted by the third party payment provider, where the card details are entered (for new cards) or pre-populated (for an existing card).
  - Payments are processed and a response is sent to CMP:
    - If successful the payment is posted to the Sales Ledger and the Account **Balance** is updated.
    - If unsuccessful the configured **Workflow Event** is raised triggering any **Actions**.
  - In both scenarios an audit of the payment outcome is created in the CMP database.

Card numbers are not stored in CMP. An external system can register a card in CMP with a token that can be used in future for one-off payments using that card.

3.1.7.5 Batch Payment Upload

Service providers can have the ability to accept one-off payments via third parties outside of CMP, for example direct bank transfers.

Customer and payment details are captured in Batch Payment Upload extracts

CMP uses the customer **Account Number** specified to search for an Account in CMP:

- If an Account is identified, the payment is posted to Sales Ledger and the customers Account Balance is updated.

- If the Account is not identified, the payment is posted to an Unallocated Account, requiring manual investigation by the Managed Service.

3.1.7.6 Refunds

Refunds are raised in AgentView or by web services, with the option to refund by direct debit, credit or debit card, or manual payment (cheque).

CMP users can select the amount to be refunded which is then processed via a third party payment interface. Refunds are returned to the preferred payment method or by cheque for manual payment methods. Manual payment refunds are processed by the Recurring Payment job running in CHEQUE mode.

CMP has functionality to handle refund rejections and expired payment methods.

3. 1. 8 Credit Management

Credit management in CMP comprises:

- Credit control
- Extracts for Debt Recovery Agencies
- Extracts for Credit Reference Agencies

3.1.8.1 Credit Control

The integrated Credit Control module in CMP provides the capability to pursue overdue payments through a series of configurable procedures. When invoices are produced, payment is normally required within a configurable number of days. If payment is not made within this time frame, the subscription enters the applicable credit control procedure.

The criteria to enter a credit control procedure are as follows:

- There must be an overdue balance in accordance with the customer's payment terms.
- The configured **Minimum Overdue Amount** must have been exceeded.

A credit control procedure is a preconfigured, automated, and time-defined set of activities. This procedure, sometimes referred to as *dunning*, methodically communicates with customers to ensure the collection of accounts receivable.

Credit control procedures are configured in line with service provider business rules. These business rules typically involve automatic generation of correspondence - SMS, email, calls, letters - or automatic provisioning activity such as applying bars. Communications can progress from gentle reminders to strongly-worded correspondence and restriction of service.

Credit control procedures can be linked to **Account Types** and the **Identity** on an account, allowing different procedures to be carried out.

An example credit control procedure is as follows:

- Account Balance becomes overdue (Day 0).
- Stage 1 (Day 3) - Letter generated to customer reminding of overdue balance and confirming ways to pay.
- Stage 2 (Day 7) - Workflow Event Generated for CSA to telephone customer.
- Stage 3 (Day 9) - Automated Provisioning Activity to apply full bar.
- Stage 4 (Day 30) - Send Account Details to Debt Recovery Agency.

Workflow Events associated with each stage enable automatic **actions** to be carried out as defined in Business Configuration. The number of stages and the actions associated with each stage can be varied according to the Account Type. The actions can range from simple use of the CMP notifications framework to queue a message for a third party system, through to automated transmission to a "Credit Management" on the previous page.

Credit Control regularly evaluates all accounts. For accounts that are not in credit control, it checks to see if they need to be added to credit control. For accounts that are already in credit control, it checks if the accounts can leave - for example, due to payment being received - or whether they need to be moved to the next stage of the procedure.

In the event of a payment being made or a query being raised regarding the amount owed for someone in credit control, a revaluation is immediately triggered to determine whether they are eligible to exit.

CMP provides a user interface and web services to interact with the above process.

Procedures can be interrupted or cancelled at any stage during the credit control procedure lifecycle, should the customer make contact and undertake to put their account in order. If the undertaking is not met, the procedure will pursue the stages of the collection process.

A payment bringing the Account up to date will automatically end the credit control procedure.

Credit Control Entry

A customer who has an overdue amount that exceeds a configurable **Minimum Balance To Recover** is eligible for entry into a Credit Control Procedure. If a customer has an open bill query, the amount specified in the query is excluded from the overdue amount until the query is resolved.

Credit Control Exit

CMP will automatically move Accounts out of Credit Control when payment or credit has been received.

Credit Control Delay

CMP can be configured to stagger or delay the number of Accounts processed by a single procedure.

3.1.8.2 Debt Recovery Agency Extract

After an account has been through the credit control process and the operator is still unable to recover the unpaid debt, the collection of that debt can be assigned to a third party known as a Debt Recovery Agency.

CMP generates a file, the Debt Recovery Agency (DRA) extract that includes accounts to be referred to the debt collection agency including details such as:

- The amount of money to recover from the customer
- The amount that was recovered since the last extract
- Contact information such as postal address, email address and telephone numbers

The agency in turn can provide feedback such as the amount recovered. When CMP receives debt recovery response files, these are automatically detected and processed.

3. 1. 9 Credit Referencing Extract

A Credit Reference Agency is an organisation that collects information to determine people's credit ratings and then makes this information available to organisations providing credit, such as banks, credit card, loan and finance companies.

CMP produces a reciprocal data extract on the payment conduct of selected customers for Credit Reference Agencies (CRAs) and applies a defined status to each customer that reflects their payment conduct. This extract is in JSON format.

- An extract file is automatically created detailing customer account information for the customer base and stored in a predefined location ready for transmission to the CRA.
- CMP can be configured to allow a list of ineligible, closed or written-off **Account Types** to be excluded from the extract. Typically, all post-paid accounts in CMP are initially in scope to be included, however certain accounts, for example VIP accounts, can be excluded based on their account type, and individual accounts can be specifically manually excluded indefinitely or up to a specified date.
- Once the file has been created, it is transmitted to the CRA via Secure File Transfer Protocol (SFTP).
- The file can be archived once it has been transmitted. Files can be purged from the archive based on their creation date. An audit of the records added to each file is maintained.

Any account that was previously detected to be in a state of Fraud, Deceased, Defaulted or Settled will automatically be excluded and this exclusion is visible in AgentView.

3. 2 Provisioning

3. 2. 1 Business Configuration and Product Catalogue

Via the Business Configuration module of the Administration Console, CMP supports configuration of an Integrated Product Catalogue, which details the products and services available to subscribers. The catalogue is flexible, typically holding airtime propositions comprising tariffs, price plans, bolt-ons, discounts, services and features.

Items can be configured as **Subscription Related**, meaning if chosen the item requires a new subscription to be created or an existing subscription to be selected.

Items can be added to the Product Catalogue, individually or as a **Price Plan**. A Price Plan relates multiple Items together, for example an offer that includes airtime, texts, data and handset insurance. When a Price Plan is selected, all Items are automatically selected when the order is placed.

Products can be configured with minimum, maximum and default price, allowing the CMP user to stipulate the price when placing a customer order. The manipulation of pricing is commonly used in business and corporate implementations where prices can be negotiated. CMP security level functionality controls which level of users have the ability to amend pricing.

For more information, see the *Business Configuration Overview*.

The Product Catalogue accepts queries from third party portals to filter bolt-ons and Value added services (VAS) according to the customers chosen Price Plan.

3. 2. 2 Number Management

Subscriptions are identified by **Serial Numbers**. These are unique identifiers against which records stored in CMP if Number Management functionality is used by the service provider.

Serial Numbers can be stored in text, numeric or alphanumeric format allowing information such as unique numbers, IDs, usernames or email addresses to be stored.

Serial Numbers are configured as per individual service provider requirements.

CMP has two types of Serial Numbers:

Managed Serial Numbers

CMP can store up to five Managed Serial Numbers against a subscription. CMP Number Management controls the numbers that are available for selection for each Managed Serial Number. Typical examples of Managed Serial Numbers include Mobile Phone Number, SIM Number, IMSI, IMEI Number, and Selfcare ID.

Non-Managed Serial Numbers

Nine additional Non-Managed Serial Numbers can also be configured, if required, to be used to address specific service provider requirements, such as SIM PINs and PUKs.

Managed and Non-Managed Serial Numbers are assigned when creating subscriptions and can be maintained in life via AgentView and web services.

> During the life of a subscription, a mobile phone number can change, for example when porting in or changing a number due to nuisance calls.

3.2.2.1 SIM Profile Loader

A SIM profile - or SIM card - is an integrated circuit that is intended to securely store International Mobile Subscriber Identity (IMSI) details, which are used to identify and authenticate subscriptions on mobile telephony devices such as mobile phones or laptops. The SIM card itself has its own unique reference known as an Integrated Circuit Card Identifier (ICCID), which cannot be changed. CMP allows for a primary and secondary profile to be stored for a given ICCID.

CMP automatically loads files of SIM profiles that are received for use in allocation to subscribers and resolving agent queries, for example a customer contacting the call centre to request a Personal Unlocking Key (PUK) code to unlock their phone.

3. 2. 3 Lifecycle Management

Mobile phone numbers that have been disconnected or are no longer used (due to a number change for example) are managed by Lifecycle Management.

Number Management can handle any type of number but is typically used for mobile numbers.

Phone numbers remain in Lifecycle Management for a pre-determined number of days known as the **Cooling Off Period**. Once these days have passed, the number can be reused by another Subscription.

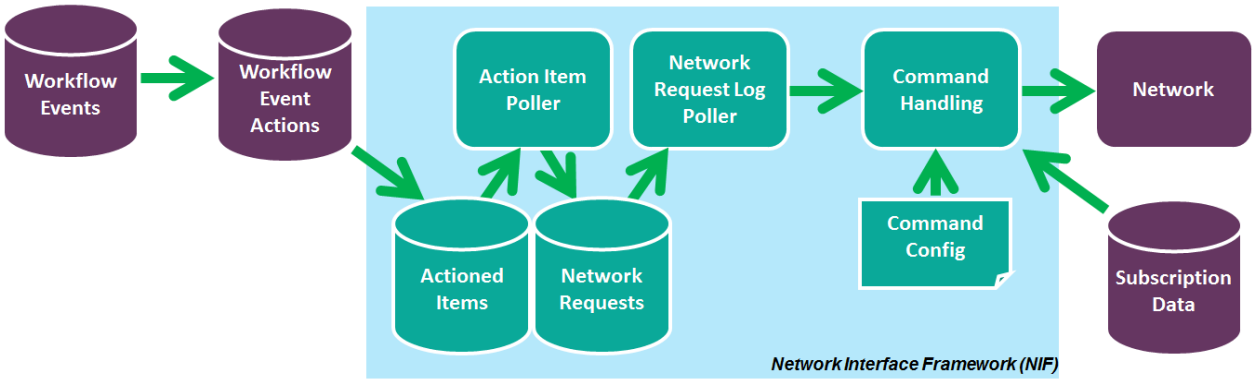
Numbers not owned by/allocated by the Service Provider are removed from CMP. This includes numbers which have been ported out. In these scenarios numbers cannot be recycled.

3. 2. 4 Network Provisioning

CMP handles provisioning requirements such as subscription activation, deactivation, suspension, un-suspension, and services Activation using the Network Interface Framework (NIF) to interact with a third party provisioning system.

The Network Interface Framework is driven by a **Workflow Event** configured with the appropriate **Workflow Event Actions**. Each Action has one **Action Item** associated with it. An Action and Action Item must be contained within a Workflow Event to create a provisioning request.

Actioned Items can be viewed, monitored and maintained in the Action Items screen in AgentView.



CMP Network Interface Framework (NIF)

3.2.4.1 Network Provisioning Process

The Action Item Poller periodically searches for new Actioned Items that identify commands waiting to be sent to the network. Details of the commands are written to the Network Requests Log.

The Network Request Log Poller searches for commands awaiting processing in the Network Request Log. These commands are handed over to Command Handling routines which read appropriate information from the CMP Subscription database files, transforming those details into a suitable format which are then sent to the network.

Where an interface is synchronous, CMP sends the request and handles the response. Where the request is asynchronous, CMP may make periodic calls to the network to check the status of the request. The response is processed according to business rules specific to the network.

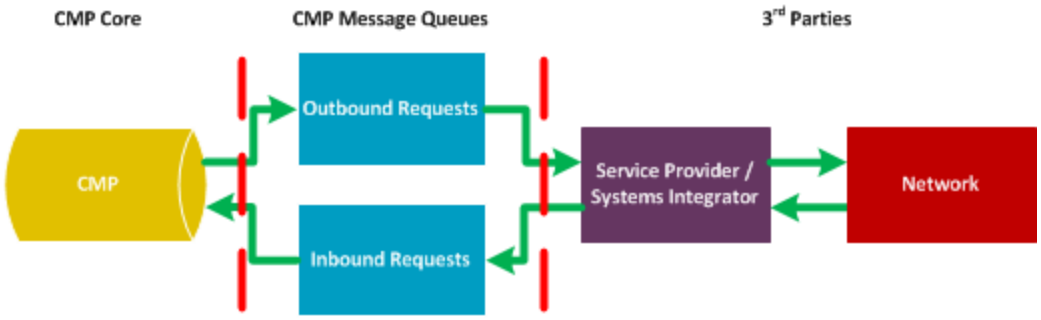
The status of the actioned item is then updated to reflect the outcome of the request. The Notes of the associated **Workflow Event** are also updated, capturing Network specific details.

Successful requests lead to the Subscription being updated to reflect the changed state. In the event of an error, the associated Workflow Event will be moved into an error status and passed to an appropriate **Worklist** for review.

3.2.4.2 Generic Provisioning Interface

The CMP Generic Provisioning interface is alternative functionality to the standard CMP provisioning process when network integration is required. The CMP Generic Provisioning interface provides a message queue-based interface, allowing a Service Pro-

vider or systems integrator to handle the integration between the CMP interface and the network:



CMP Provisioning Interface

Generic Provisioning uses Workflow Events and the existing CMP Network Interface Framework (NIF) to generate provisioning requests and places the requests on the outbound message queue instead of talking directly to the network.

The Service Provider or systems integrator monitors the message queue and translates the generic request messages to the format required by the network before sending the request to the network.

The network returns a response to the Service Provider or systems integrator, who translates the network response into the generic format expected by CMP Generic Provisioning and places the response on the inbound message queue, where it is picked up by CMP and processed appropriately.

Errors are output in the same way standard provisioning requests are made if encountered.

3.2.4.3 Network Porting Processing

CMP, in the UK, interfaces with Syniverse to fulfil the regulatory porting scenarios required by OFCOM including creation and management of Porting Authorisation Codes (PACs) codes to support porting in and out of the service provider's network.

CMP supports both donor and recipient led port processes.

As part of the port-out process, CMP holds details of the PAC and the PAC expiry date.

CMP uses **Workflow Event Actions** to automatically send a disconnection request to the donor network to disconnect a subscriber.

As part of the port-in process, CMP retains details of the:

- customer
- Mobile Station International Subscriber Directory Number (MSISDN) being ported
- porting (donor) network

- PAC
- port-in date

CMP uses Workflow Event Actions to automatically send a provisioning request to the recipient network to connect the Subscriber.

3.2.4.4 Port Out - donor led example

1. CMP generates PAC codes and registers them with the Mobile Number Portability (MNP) platform.
2. On the appropriate days of the week, CMP retrieves the port outs for the next port date and schedules the port out requests.

Port outs take place Monday to Fridays, not including public holidays.

3.2.4.5 Port In - donor led example

1. CMP accepts Porting Authorisation Code (PAC) and Port Mobile Station International Subscriber Directory Number (MSISDN) details either through its GUI or via the web service interface.
2. Through both channels, CMP interacts with the Mobile Number Portability (MNP) platform to close the PAC and confirm the port date.
3. On the appropriate days of the week, CMP retrieves the port ins for the next port date and schedules the port in requests in line with network requirements.

3.2.4.6 Generic Porting Interface

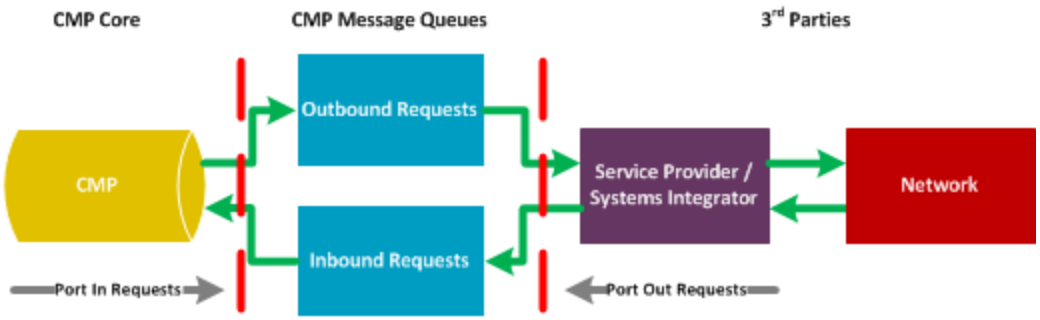
The CMP Generic Porting interface is alternative functionality, to the standard CMP porting process, when recipient-led porting is required inside and outside of the UK.

The CMP Generic Porting interface is a message queue-based interface that allows a Service Provider or systems integrator to perform the integration between CMP and country-specific porting interfaces. The Generic Porting interface is based on the same message queue framework as Generic Provisioning.

The Generic Porting interface supports:

- Port In
- Port Out
- Cancel Port In
- Reverse Port In/Out

Requests and responses are placed on a message queue and are picked up appropriately by CMP or the Service Provider or systems integrator depending on the porting scenario. For example, port in requests are initiated in CMP and port out requests are initiated by the Service Provider:



CMP Porting Interface

Generic Porting interface configuration can be tailored to meet specific business requirement and porting processes.

It is the responsibility of the Service Provider or systems integrator to handle the translation of CMP generic messages to and from the format required by the third party network or country-specific porting interfaces.

3. 2. 5 Data Warehouse Extracts

CMP provides the following extracts to provide information relevant to the deployed functional footprint to an external data warehouse:

- Account
- Agreement
- Subscription
- Subscription Service
- Transaction Detail
- Unbilled Usage
- Billed Usage
- Invoice Detail
- Unallocated Usage
- Key Customer Information
- Payment Details
- Prepaid Usage

3. 2. 6 Standard Reports

The following standard reports are provided:

- Aged Debt: Identifies all accounts with outstanding balances and their associated ageing profiles.
- Average Revenue per Customer & Account Type: Uses the total invoiced value in the period as the driver to produce a monthly spend report per customer.
- Billing Summary: A summary report of billing by bill cycle to ensure billed revenue can be tracked over time.

- Customer Accounts on Active Credit Control Procedure: Outputs all accounts that are undergoing credit control treatment and the current credit control stage the account has progressed to.
- Customer Accounts with Open Query Amounts: Shows all customer accounts where there is an open amount in query and the ageing of the query to allow pro-active management of unresolved queries.
- Disconnected Subscribers: Identifies all subscriptions that are disconnected in the reporting period, by the reported reason for disconnection, to ensure integrity of other applications/solutions.
- Invoice Audit Trail: Lists all invoices posted to the Sales Ledger for the reporting period for reconciliation purposes.
- Monthly Billed Services & Nominal Codes: Summary of all services billed during the month together with the nominal code that the services map to.
- Overdue Unresolved Workflow Events: To report on instances related to collection processes where, for a Workflow Event, the resolution required by date has been exceeded.
- Receipts Audit Trail: Provides a listing of all receipts received during the reporting period to assist in reconciliation.
- Payments In Suspense Account: Details all currently unapplied cash, the balance and the ageing of the items.
- Unbilled Usage Summary Report: Details and summarises all unbilled usage allocated to subscribers in CMP.
- Workflow Events Report: Summary and supporting details of all workflow events, related to the collection process, that are raised within the reporting period.

3. 3 CMP Optional Components

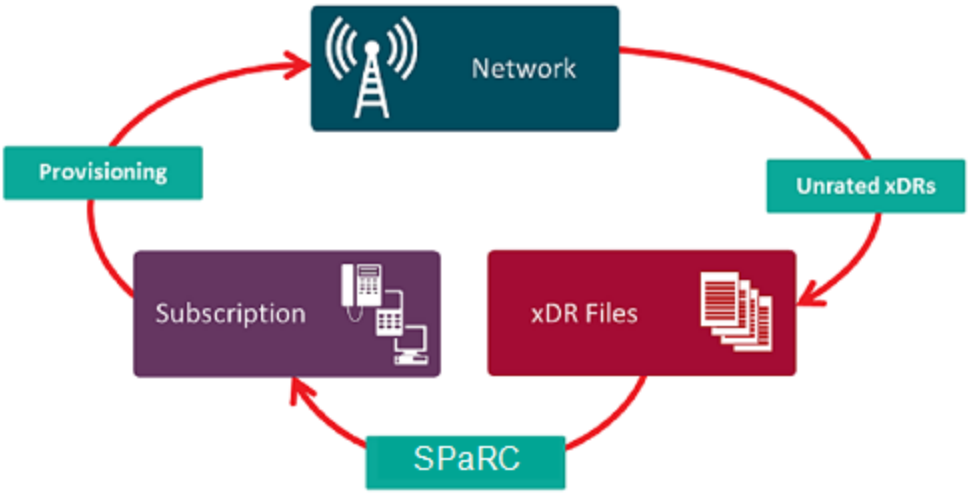
CMP can be deployed as:

- A pure offline solution handling post-event Call Data Records (CDRs) and applying usage against allowance allocations
- A pure online solution integrating to a third party OCS such as Openet
- A combined offline and online solution providing both online charging for real-time control and offline rating for wholesale charging.

3. 3. 1 Offline-only

An offline-only CMP deployment provides the ability to process post-event CDRs received from the underlying core network components, rate them and apply the usage and charges to existing allowance and spend cap allocations. The offline rating engine, SPaRC, can rate any type of usage and bundle usage against existing allowances or charge against an account balance. Usage is either bundled against a subscription allow-

ance or rated based on the tariff of the subscription's price plan and the associated pricing rules defined through the Pricing Configuration options.



Offline Charging Overview

For chargeable usage, usage-based discounts can be applied based on any discount scheme allocated to the subscription. Rated usage is also applied against any qualifying spend caps and both allowance and spend caps are monitored against configured notification thresholds. When a threshold is breached, SPaRC will trigger a notification, if configured, to be sent to the end customer. The thresholds configured against subscription allowances can be viewed from the Allowance panels in AgentView.

Rating can be:

- Fixed rate - a fixed charge irrespective of the service usage duration.
- Flat rate - a rate per time period, for example 10p per minute.
- Tiered rate - accumulated charge for each relevant tier based on the usage duration.
- Threshold rate - the rate used is determined by the threshold level applicable to the usage duration.

Usage can be differentially rated based on:

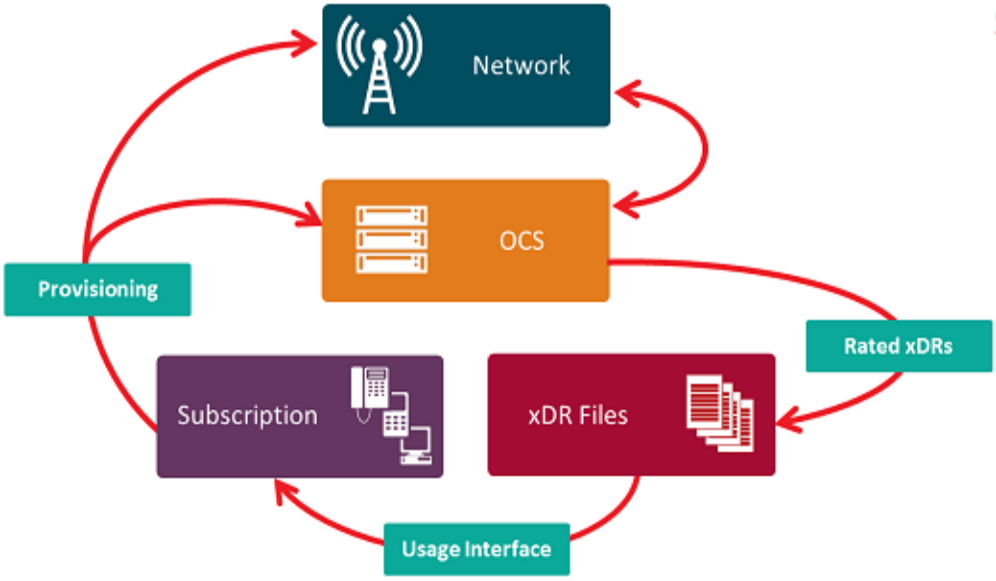
- The subscription tariff
- The usage type (Voice, Data, SMS)
- The time of day and day of the week
- Whether the usage is mobile originating or terminating
- Where the usage originated within the home network or outside

- The origin and destination zones
- The specific destination address, that is dialled digits.

Offline Rating performs duplicate usage checking before decrementing any bundle allocation or attempting any pricing.

3. 3. 2 Online Charging

CMP is integrated with an Online Charging System (OCS) for real-time rating, and balance management.



Online Charging Overview

In an online charging implementation, rating, and usage-based discounting are handled by the Online Charging System (OCS) in real-time as the service is consumed. The xDRs produced by the OCS to reflect the rated usage are processed into CMP via the usage interface. CMP performs supplementary classification to support the bill presentation and any reporting requirements of the service provider.

3.3.2.1 OCS Interaction with the network

When a customer initiates a form of usage, a credit control request is made to the OCS. A credit control request asks the OCS for a number of seconds for voice, a volume of data or a Y/N for an event.

The OCS issues the quota to the network and the call/session is connected. The quota amount is configurable in the OCS.

Once the quota is consumed, the network requests for more. As each quota is requested, the OCS Balance is updated immediately.

When the call/sessions ends, the network sends a final request/message to the OCS containing the amount of the last quota allocation used. The OCS Balance is updated immediately to reflect the final total amount of usage consumed.

3.3.2.2 CMP Interaction with the OCS

xDR files are received from the OCS, transformed and individual usage records are given a Call Class Code by CMP Rated Usage functionality.

Once classified, the processing function of Rated Usage allocates classified usage to the required subscription and for postpaid subscriptions the usage records are written to the Unbilled Call Detail file in preparation for invoicing.

All usage rating and discounting is performed in the OCS in real time, not CMP.

3.3.2.3 Key features of Online Rating

Real Time Visibility

CMP web services are used to query the OCS to identify remaining allowances and spend providing a real time view of usage, spend, **Caps** and **Features** - presented in AgentView for CMP users, and in self-care application for customers.

Proposition Configuration

- A CMP **Allowance** is used to provision and purchase an **Offer** in the OCS. Each CMP Allowance - for example *100 Inclusive Minutes, 5000 Inclusive Text Messages, 2 GB Inclusive Data, and 1GB Data Add-on* - is mapped to an OCS Offer.
- An OCS Offer is associated to an OCS **Balance**. A Balance is the allowance or monetary amount available as part of the Offer.
- Allowances can be viewed in real time in AgentView and in self-care portals via the CMP web services.
- CMP users and customers can view Allowance information to identify the Starting Balance, Remaining Balance, Amount Used So Far, and so on.

Caps

Track Subscription usage, triggering alerts when usage exceeds configured thresholds.

- Caps must be configured in CMP if required and linked to an Offer/Balance in the OCS. When a Spend cap is set in CMP, the configured Caps are added automatically.
- When the final threshold is reached, the Offer can no longer be used. For example when 100% of a 100 minute allocation of inclusive minutes is consumed, the customer will no longer be able to make calls unless a further one-off Offer for extra minutes has been purchased. The Cap, along with the Balance, will be reset on the customer's bill cycle.

Features

Features can be configured to enable/disable a Feature or bar/unbar a Feature.

- Features reduce the amount of provisioning required to the network from CMP by simply selecting to enable/disable a Feature, Data Rollover or Adult Content Filter; or bar/unbar a Feature, International Roaming, Premium Rate Bar or Fraud Bar.
- Features allow CMP users to easily view and enable/disable or bar/unbar a Feature at the request of the customer in AgentView. The customer themselves can also control their Features via self-care applications using the CMP web services.

3.3.2.4 Rated Usage Loader

Every time a subscriber uses their handset to make a call, send a text, browse the web or carry out any other activity, the network records this activity and makes the information available for collection, typically in batches. The Rated Usage job is responsible for processing rated usage records into CMP so that usage data can be included in a subscriber's detailed bill, available to Call Centre Staff via AgentView or via a self-care application.

The CMP Rated Usage functionality is for use in a deployment in which an Online Charging System (OCS) is used to rate all usage. CMP automatically loads files of rated usage records and allocates them to the subscriber. The rated usage will then be available in the system for inclusion on the next detailed bill in the case of post-paid accounts.

Online rating involves the following:

1. **Rated Usage Transformation**

   When CMP receives files containing rated usage records from an OCS, if not already in the required format, they must be converted to the required internal JSON format. This is handled by the Transformation Rated Usage daemon. When a JSON file is produced, this triggers the Load Rated Usage daemon.
2. **Rated Usage Load**

   Rated Usage JSON files are automatically detected by a dedicated daemon - the Load Rated Usage daemon. The daemon validates the JSON files are in the correct format and creates a rated usage batch in CMP for each file received.
3. **Rated Usage Processing**

   The Rated Usage job is automatically triggered whenever a new rated usage batch is created. It processes the JSON files into CMP staging database tables and some final CMP database tables. The job also performs and handles validation for data in the JSON file, for example:
   - Invalid call class
   - Invalid allowance
   - Subscription not found
   - Sensitive numbers
   - Duplicate checks
   - Aged calls

This job does not perform any usage rating itself; usage is already priced when it arrives in CMP. This job is designed to work in conjunction with a network that supports a real time engine that rates the usage as it happens.

3.3.2.5 Charge Loader

CMP allows for non-usage charges, such as one-off charges and monthly recurring changes, that have already been calculated outside of CMP to be included as part of an invoice with the descriptive text that is provided. These charges can be invoiced immediately or deferred to the next billing cycle.

The external charges are mapped to subscription or account services and are invoiced *as is* directly by the non-subscription aspect of Invoice Production without any additional charge calculation processing by CMP. The charges will be considered for tax (exempt, tax inclusive or exclusive, account tax override) by Invoice Production.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

3. 3. 3 Customer Communications

CMP supports outbound communication to the customer. The CMP Communications module handles all types of communications, including letters, emails, SMS and push notifications, and it can support multiple languages. Communications can be triggered by a workflow event. Communications can also be associated with triggers from external systems.

The Communications module allows customers to:

- Opt in or out of certain communications.
- Set time exclusions.
- Set preferences for communication methods, for example email, letter or SMS.

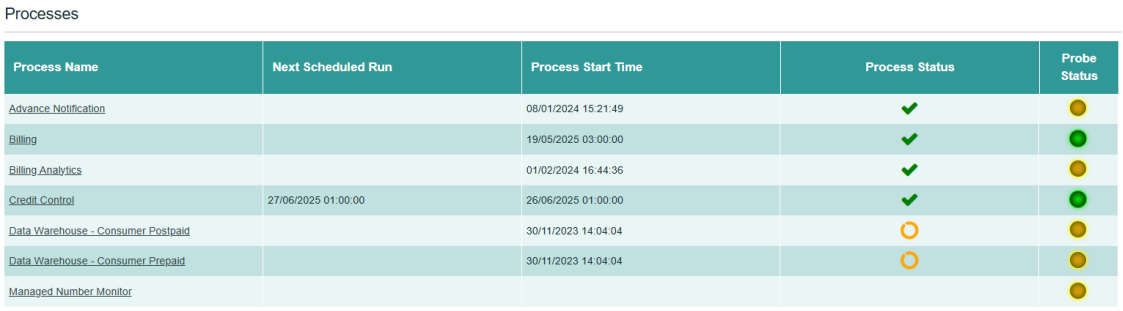
4.0 Operational Overview

4. 1 CMP Administration Console

The CMP Administration Console allows processes to be scheduled, run manually and monitored. Jobs can be run in the following categories:

- Billing
- Communications
- Credit Management
- Data Warehouse
- Financials (Sales Ledger)
- Number Management
- Payments
- Prepayment
- Provisioning
- Sales Orders
- Device Enrolment
- Purging
- Usage
- Workflow

The Daily Operation Processes shows an overview of the processes configured to be run and their current status:


Processes

Process Name	Next Scheduled Run	Process Start Time	Process Status	Probe Status
Advance Notification		08/01/2024 15:21:49	✔	
Billing		19/05/2025 03:00:00	✔	
Billing Analytics		01/02/2024 16:44:36	✔	
Credit Control	27/06/2025 01:00:00	26/06/2025 01:00:00	✔	
Data Warehouse - Consumer Postpaid		30/11/2023 14:04:04	○	
Data Warehouse - Consumer Prepaid		30/11/2023 14:04:04	○	
Managed Number Monitor				

Example of Processes Screen

Should a process fail or not behave as expected, automatic alerts are triggered and notifications can be distributed via a variety of channels from simple email to more sophisticated third party monitoring software, such as Nimsoft.

The console also provides for viewing and modification of business and user applicable system configuration.

4. 1. 1 Business Configuration and Product Catalogue

Through the Business Configuration module of the Administration Console, CMP supports the configuration of Propositions, which make up an Integrated Product Catalogue that details the products and services available to subscribers. Typically, the configured Propositions comprise tariffs, price plans, bolt-ons, discounts, services and features.

Propositions can consist of individual items or a Price Plan. A Price Plan relates multiple Items together, for example an offer that includes airtime, texts, data and handset insurance. When a Price Plan is selected, all items are automatically selected when the order is placed.

Products can be configured with minimum, maximum and default price, allowing the CMP user to stipulate the price when placing a customer order. The manipulation of pricing is commonly used in business and corporate implementations where prices can be negotiated. CMP security level functionality controls which level of users have the ability to amend pricing.

The Product Catalogue accepts queries from third party portals to filter bolt-ons and Value added services (VAS) according to the customers chosen Price Plan.

In the Business Configuration module, you can configure the following:

- Propositions

  Build real-time and offline propositions from components. Use price plans to bring together tariffs, packages, contracts, and connection options to simplify integration and customer care activities. You can configure tariffs, packages, services, and discounts, among others.
- Orders

  You can define the elements related to an order, such as products, warehouses, and order delivery methods.
- Workflow

  To help automate business processes and network provisioning, configure workflow event types and codes and the action codes and types to carry out the event-driven actions, including provisioning, account type movements, and subscription services.
- Communications

  Define how to communicate with end customers. Create new communications, including the intended recipient level and which communication method to use based on an internal or external trigger. Configure triggers, rules, and preferences for communications, as well as aliases. You can also define and maintain customer-specific attributes that can be included in communications.
- Customer Management

Configure the reason types, categories and codes, occupations, and other parameters used in AgentView for customer management.

- Billing

  Define configuration relating to generating and presenting customer invoices. This includes creating codes to group nominal accounts in the sales ledger and defining tax codes and associated tax rates to apply tax to usage and services, and defining the billing media on what the invoice should be output.

- Payments

  Control how payment requests to external payment platforms are handled by defining code for direct debit mandate revisions and recurring payment rejections.

- Usage Processing

  Define how usage record types received from network components are classified into meaningful usage descriptions and configure suppressed numbers that won't display on an invoice.

- Credit Management

  Configure account types, credit control procedures, debt recovery agencies and spend caps to control how outstanding payments are processed and collected.

- Network

  Configure network command codes and groups. Define subscription features that can be provisioned onto the underlying network to enable additional network capabilities for the subscriber. Define the default behaviour of a feature for specific networks and whether the feature can be controlled by the end customer.

- System

  Configure systemwide parameters, application parameters and parameters for modules installed on the system.

For more information, see the *Business Configuration Overview*.

4. 2 Number Management

Subscriptions are identified by Serial Numbers. These are unique identifiers against which records are stored in CMP if Number Management functionality is used by the service provider.

Serial Numbers can be stored in text, numeric or alphanumeric format allowing information such as unique numbers, IDs, usernames or email addresses to be stored.

Serial Numbers are configured as per individual service provider requirements.

CMP has two types of Serial Numbers:

Managed Serial Numbers

CMP can store up to five Managed Serial Numbers against a subscription. CMP Number Management controls the numbers that are available for selection for each Managed Serial Number. Typical examples of Managed Serial Numbers include Mobile Phone Number, SIM Number, IMSI, IMEI Number, and Selfcare ID.

Non-Managed Serial Numbers

Nine additional Non-Managed Serial Numbers can also be configured, if required, to be used to address specific service provider requirements, such as SIM PINs and PUKs.

Managed and Non-Managed Serial Numbers are assigned when creating subscriptions and can be maintained in life via AgentView and web services.

During the life of a subscription, a mobile phone number can change, for example when porting in or changing a number due to nuisance calls.

4. 2. 1 SIM Profile Loader

A SIM profile - or SIM card - is an integrated circuit that is intended to securely store International Mobile Subscriber Identity (IMSI) details, which are used to identify and authenticate subscriptions on mobile telephony devices such as mobile phones or laptops. The SIM card itself has its own unique reference known as an Integrated Circuit Card Identifier (ICCID), which cannot be changed. CMP allows for a primary and secondary profile to be stored for a given ICCID.

CMP automatically loads files of SIM profiles that are received from an external SIM manufacturer for use in allocation to subscribers and resolving agent queries, for example a customer contacting the call centre to request a Personal Unlocking Key (PUK) code to unlock their phone.

4. 2. 2 Lifecycle Management

Mobile phone numbers that have been disconnected or are no longer used (due to a number change for example) are managed by Lifecycle Management.

Number Management can handle any type of number but is typically used for mobile numbers.

Phone numbers remain in Lifecycle Management for a pre-determined number of days known as the **Cooling Off Period**. Once these days have passed, the number can be reused by another Subscription.

Numbers not owned by/allocated by the Service Provider are removed from CMP. This includes numbers which have been ported out. In these scenarios numbers cannot be recycled.

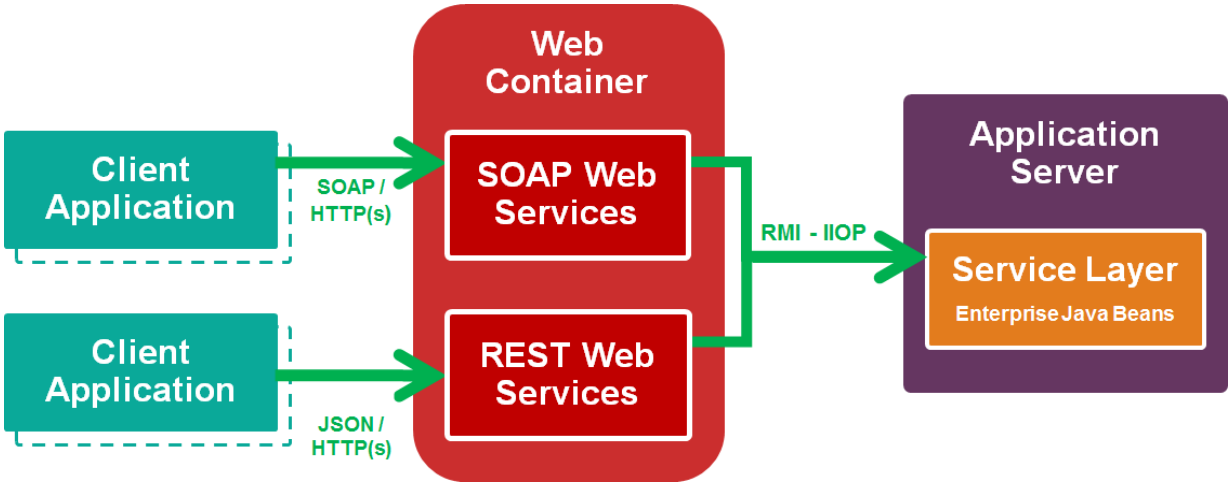
5.0 Integration Overview

5. 1 CMP Web Services

The CMP web services provide a set of APIs that allow external applications to query, create and update customer data in CMP. Additional web services are available to query product catalogue data to support order processes and in-life changes.

Two types of interaction are supported:

- Requests to view and manage customer data from external applications, such as Business Process Orchestration, Self-Care and CRM. Some examples include setting up Bill Account and Customer, terminating subscriptions and querying unbilled usage charges.
- Requests to view and automate management of key business configuration data from external applications such as a centralised product catalogue.



Web Services Overview

The web services provide visibility of all relevant customer data to allow developers to integrate bespoke Customer Relationship Management and self-care platforms with CMP without constraining the available information.

> The complete list of CMP web services can be found in the *Web Services Semantics Guide* and the *RESTful Web Services API Guide*.

5. 1. 1 Customer Management APIs

Customer Management web services enable client systems to manage their customers' telecommunications requirements while also supplying those customers with the capability to manage their own requirements, via a series of e-services. The CMP application is integrated with client systems by using a number of CMP consumer web services that

can be called from internal and external web-based applications belonging to the client, such as an online shop or from inside retail outlets. CMP web services reflect many of the customer care activities that can be performed manually in CMP. Generally, each CMP web service is analogous to a CMP screen or wizard process - creating a new agreement or processing a payment, for example. Some example APIs include:

- Setting up Bill Account and Customer
- In-life changes, such as MSISDN change, Bill Cycle change, Bill Address change, Name change, Bank Account changes
- Terminating subscriptions
- Adjustments to the Account, for example credit/debit adjustments
- Placing an invoice into Query/Dispute
- Suspending Credit Control/Dunning procedures
- Querying information relating to Billing, for example transactions posted to the customer's account (invoices and payments)
- Querying Unbilled Usage charges
- Querying Account Balance and Amount Due
- Querying Bill Address, Bill Cycle, Customer Name, Bank Account
- Querying Credit Control/Dunning status

5. 1. 2 Product Catalogue APIs

Product Catalogue web services enable an external system to enquire and manage the customer marketing propositions and Business Configuration data configured to support the CMP business processes. All actions that can be performed through the Business Configuration GUI are also supported through the exposed RESTful web services.

5. 2 External Systems Interfaces

CMP supports a number of business processes that require integration with third party systems to effect the end-to-end process, for example financial institutions for payment authorisation or debt recovery agencies for the recovery of outstanding debt on an account.

CMP has three types of integration mechanisms:

- API integration where CMP invokes a third party API as part of a business process, for example online payment authorisation
- Message queue integration whereby a third party retrieves messages from a CMP queue, for example push notifications to a self-care app
- File-based integration where CMP either generates a generic output file or receives a file from a third party system and converts that to a generic CMP format. All files generated and processed by CMP's functional modules adhere to the MDS Global

documented JSON format for the interface in question. The system can be configured to operate with encrypted JSON files for all interfaces if required.

Specific file formats required by external systems are pre- or post-processed to, or from, the appropriate JSON format by adapters. Adapters can be provided as part of the CMP product or developed and delivered by MDS Global Professional Services. The required automatic processing sequences can be set up through the Administration Console described in "CMP Administration Console" on page 32.

5. 2. 1 Address Lookup

CMP AgentView optionally provides the capability to retrieve a list of possible addresses from an entered postal code. The address lookup capability integrates with a third party API to provide a list of addresses matching the postal code.

5. 2. 2 Bank Lookup

As part of entering bank account details required for direct debit registration for example, CMP can optionally verify the bank sort-code entered to return the details of the corresponding bank branch.

5. 2. 3 Order Fulfilment

5.2.3.1 Order Request

When a hardware sales order is completed through CMP, a corresponding order request file is sent to the warehouse to provide details of the specific order, including a list or items ordered for pulling and dispatch.

CMP provides a standard JSON format for the order request file. Where the warehouse has specific formatting requirements an adapter is required to convert the standard CMP output into the specific warehouse format.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.3.2 Order Dispatch

Once an order request has been satisfied and dispatched, that information on the status of the order and the time of dispatch is provided back to CMP. The file contains item serial numbers and other item attributes as appropriate.

CMP provides a standard JSON format for the order dispatch file. Where the file provided is in a warehouse specific format an adapter is required to convert from the warehouse format to the standard CMP format before upload into CMP.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5. 2. 4 Bill Print

Once the bill print files have been generated at the end of the Billing process, the bill print file is made available to an external print vendor that is responsible for the generation of the PDF bill for distribution and enquiry.

The format of the PDF bills is customisable to meet the specific needs of the Digital Service Provider including branding, styling and layout.

Once the PDF bills have been generated the system can automatically email the bills out to end customers based on the email address provided in the bill file. The formatting process also supports generation of PDF bills for printing or distribution in other media types such as Braille or audio.

The PDF bills can either be pulled back onto CMP for local storage and subsequent enquiry through AgentView or from an external system using the CMP web services, or can be viewed from an external print bureau using third party APIs.

5. 2. 5 Financials

At the end of the billing process a sales ledger extract is generated that provides a list of all invoice transactions posted to the CMP Sales Ledger. This can then be used by an external Sales Ledger system.

CMP provides a standard JSON format for the sales ledger extract file. Where the external sales ledger has specific formatting requirements then an adapter is required to convert the standard CMP output into the specific format required by the external sales ledger system.

> For more information, see the *CMP Batch Job and JSON Schema Guide*.

5. 2. 6 Direct Debit Instructions

A direct debit is an instruction from a customer (debtor) to their bank or payment services provider, authorising an organisation (creditor) to collect variable or fixed amounts from their account, as long as the customer is given advance notice of the collection amounts and dates. This instruction is referred to as a Direct Debit mandate.

5.2.6.1 Mandate Registrations

Periodically CMP generates a batch of new direct debit instructions for transmission to external payments systems, which in turn transfer these instructions to the paying financial institutions.

CMP provides a standard JSON format for the direct debit instructions file. Where the external payments system has specific formatting requirements then an adapter is

required to convert the standard CMP output into the specific format required by the external system.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.6.2 Mandate Revisions

When new direct debit instructions are sent to an external payments system, some instructions can fail, for example, due to incorrect bank details. Successful instructions may also subsequently be amended or cancelled by the customer. As a result, CMP may receive files from the external payments system containing rejected, amended or cancelled instructions that are automatically detected by CMP and the relevant mandate records updated or cancel. Cancellation in CMP typically involves reverting the account to a manual payment type.

CMP provides a standard JSON format for the external payments system mandate revisions file. Where the file provided is in a vendor-specific format then an adapter is required to convert from the third party format to the standard CMP format before processing by CMP.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5. 2. 7 Offline Payments

5.2.7.1 Recurring Payments

At the end of the billing process, CMP creates a batch of payments due for accounts that have been configured to pay by either direct debit or recurring credit or debit cards. The batch also includes accounts that have approved refunds by credit or debit card due.

CMP provides a standard JSON format for the recurring payments file. Where the external payments system has specific formatting requirements then an adapter is required to convert the standard CMP output into the specific format required by the external payments system.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.7.2 BACS Adapter

The UK banks' payment clearing service is managed by Banker's Automated Clearing Services (BACS). When CMP is being used in the United Kingdom, the Direct Debit and Credit files generated and processed by CMP need to be converted to, or from, the formats processed by BACS applying the specific processing logic that BACS dictates.

CMP automatically carries out these conversions and supports:

- Automated Direct Debit Instruction Service (AUDDIS)
- Automated Direct Debit Amendment and Cancellation Service (ADDACS)

- BACS Direct Debit & Credit
- Automated Return of Unpaid Direct Debits Service (ARUDD)
- Automated Return of Unapplied Credits Service (ARUCS)
- Advice of Wrong Account for Automated Credits Service (AWACS)

5.2.7.3 Recurring Pre-payments

Customers can purchase pre-paid bolt-on packages which are paid for on a recurring basis, for example every 30 days. Payments can be done by credit/debit card or from the customer's pre-paid cash balance. CMP creates a separate batch for payments that are due for settlement by card and settlement from a pre-paid balance.

CMP provides a standard JSON format for the recurring card pre-payments file and a different JSON format for the recurring balance pre-payments file. Where the external payments system has specific formatting requirements then an adapter is required to convert the standard card pre-payments CMP output into the specific format required by the external payments system. Balance pre-payments are handled by the integration to the Online Charging System (OCS).

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.7.4 Non-recurring Payments

Non-recurring payments occur when, rather than opting to pay their bill automatically each month, a subscription chooses to pay on their own terms, a payment by cash, for example. Records of these payments must be loaded into CMP from an external payments system and reconciled against the subscription's account.

CMP provides a standard JSON format for the external payments system non-recurring payments file. Where the file provided is in a vendor-specific format then an adapter is required to convert from the third party format to the standard CMP format before processing by CMP.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.7.5 Payment Rejections

When recurring payment and refund transactions are sent to an external payments system, some transactions can fail, for example due to insufficient funds or lost and stolen cards. These rejected transactions must be processed by CMP to reverse the corresponding payment in the Sales Ledger.

CMP provides a standard JSON format for the external payments system payment rejections file. Where the file provided is in a vendor-specific format then an adapter is required to convert from the third party format to the standard CMP format before processing by CMP.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5. 2. 8 Online Card Payments

CMP provides the ability for agents to take one-off card payments through AgentView that requires integration to an external financial institution to perform payment authorisation. When a one-off payment is required, CMP will redirect the agent to the third party payment entry screen to capture the payment amount and card details. No card details are stored in CMP.

Integration to the external financial institution is achieved through API integration.

5. 2. 9 Debt Recovery

5.2.9.1 Extract

After an account has been through the credit control process and the operator is still unable to recover the unpaid debt, the collection of that debt can be assigned to a third party known as a Debt Recovery Agency (DRA).

Debt Recover Extract provides a JSON format output that includes accounts to be referred to a DRA. The batch includes details of the debts be recovered and customer contact information.

CMP provides a standard JSON format for the DRA extract file. Where the DRA has specific formatting requirements, an adapter is required to convert the standard CMP output into the vendor-specific format.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.9.2 Response

Once the extract has been provided to the DRA, they can subsequently provide feedback on any amount recovered and/or payment plans imposed. When CMP receives debt recovery response files, these are automatically detected by CMP and the corresponding account details are updated to reflect the debt recovery progress.

CMP provides a standard JSON format for the DRA response file. Where the file provided is in a vendor-specific format, an adapter is required to convert from the third party format to the standard CMP format before upload into CMP.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5. 2. 10Credit Reference Extract

The Credit Reference Extract provides a Credit Reference Agency (CRA) with information to enable them to determine peoples' credit ratings. This information is provided as

a JSON format extract when the Credit Reference Extract process is run, typically once a month.

CMP provides a standard JSON format for the credit reference extract file. Where the CRA has specific formatting requirements, an adapter is required to convert the standard CMP output into the vendor-specific format.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.10.1 Equifax Insight 2001 Adapter

When CMP is being used in the United Kingdom the extract generated as described in "Credit Referencing Extract" on page 19 must to be converted to a format that major Credit Reference Agencies accept.

CMP automatically carries out a conversion to the Equifax Insight 2001 format that is accepted not only by Equifax Insight but also by Experian Credit Account Information Sharing (CAIS).

5. 2. 11Number Management

5.2.11.1 Managed Numbers

A CMP subscriber can have serial numbers associated with them. Typically, the primary serial numbers are the Mobile (MSISDN) and SIM numbers. These numbers are referred to as managed. CMP maintains the central pool of serial numbers that can be used for new subscriptions. The repository of available managed numbers is populated by uploading files containing individual numbers or ranges of numbers. Each file contains only one type of managed number.

CMP provides a standard JSON format for the managed numbers upload file. Where the file provided is in a vendor-specific format, an adapter is required to convert from the third party format to the standard CMP format before upload into CMP.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.11.2 SIM Profiles

A SIM profile is the specific details of the physical SIM card including SIM type – nano, mini SIM as well as electronic details such as SIM serial number (ACCEDE) and PIN/PUK values. The SIM profile may also contain any pre-allocated MSISDN. The SIM profile is typically provided by a SIM card manufacturer and uploaded into CMP for use in creating new subscriptions or performing SIM swaps on existing subscriptions.

CMP provides a standard JSON format for the SIM profile file. Where the file provided is in a SIM manufacturer-specific format, an adapter is required to convert from the third party format to the standard CMP format before upload into CMP.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.11.3 eSim

An electronic SIM, or eSIM, is a digital SIM card that is embedded into a device. This allows you to activate a plan without a physical SIM card, have multiple SIM profiles on a single device, change networks/service providers remotely, and bar and unbar the eSIM.

Subscriptions can be provisioned with an eSIM-enabled device.

5. 2. 12Network Provisioning

When an agent or an external system performs an action in CMP that requires interaction with the network to which CMP is integrated, a network action provisioning request is written to an outbound message queue for processing by interested adapters. Once the request has been processed by the network adapter, the result is written to a corresponding inbound message queue for processing by CMP Provisioning.

CMP provides a standard JSON format for both the outbound and inbound provisioning requests. For each network interface, a network adapter is required to convert the standard CMP output into the corresponding network commands to provision the network components and convert network responses into CMP standard JSON format.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5. 2. 13Data Warehouse Extracts

CMP provides the set of extracts to provide information relevant to the deployed functional footprint to an external Data warehouse. These extracts are provided as CSV files.

5. 2. 14Online Charging

5.2.14.1 Provisioning

When CMP Network Provisioning writes a message onto the outbound network request queue, if the request requires action on the integrated OCS then the corresponding OCS service is invoked to perform the action. The corresponding response is written to the inbound queue for processing by CMP.

CMP provides a standard JSON format for both the outbound and inbound provisioning requests. An OCS network adapter is required to convert the standard CMP output into the corresponding OCS provision commands and convert OCS responses into CMP standard JSON format.

For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.14.2 Rated Usage

Once the OCS has rated subscriber usage, it writes a usage data record to record the service consumption and any associated usage charge. Periodically a file of rated usage records is made available for CMP to process and upload into CMP against the corresponding CMP subscriptions.

CMP provides a standard JSON format for the rated usage upload file. Where the rated usage upload file is provided in a vendor-specific format, an adapter is required to convert from the third party format to the standard CMP format before upload into CMP.

> For more information, see the *CMP Batch Job and JSON Schema Guide*.

5.2.14.3 Rated Charges

CMP allows for non-usage charges, such as one-off charges and monthly recurring changes, that have already been calculated outside of CMP to be uploaded into CMP for inclusion on the customer's periodic invoice.

CMP provides a standard JSON format for the charge upload file. Where the charge upload file is provided in a vendor-specific format, an adapter is required to convert from the third party format to the standard CMP format before upload into CMP.

> For more information, see the *CMP Batch Job and JSON Schema Guide*.

5. 2. 15Customer Communications (SMS, Email, etc.)

CMP supports multiple forms of end user communication such as SMS, Push notification, email, letter or a generic message for enrichment and delivery by an external system. The communication delivery mechanism is dictated by the specific notification method:

- SMS – CMP integrates to an SMS Gateway or directly to an SMSC using the SMPP protocol
- Push Notification – CMP puts the notification message, in JSON format, onto an outbound notification queue that is consumed by the third party push notification delivery system
- Email – CMP integrates to an email gateway using SMTP/SMTPS
- Letter – CMP will generate PDF letters for printing and distribution
- External – CMP generates a JSON message and puts it onto an outbound notification queue that is consumed by the external system

6.0 CMP Technical Overview

The MDS Global-developed Cloud Monetisation Platform (CMP) is built using Java technology and industry standard Open Source components so as not to be intrinsically tied to either specific hardware or a specific operating system.

However, in order to provide the highest quality delivery and support, the system is currently tested and certified only for Red Hat Enterprise Linux 8.x running on x86_64. This provides the option to deploy in all the different ways supported by this operating system:

- Directly on physical hardware
- Using server virtualisation with VMWare, Red Hat Virtualisation or Hyper-V
- To virtual machines executing in Google Cloud, Amazon Web Services or Azure.

6. 1 Third Party Dependencies

Overall the following third party software components are required before CMP can be installed:

- Red Hat Enterprise Linux
- Red Hat JBoss ActiveMQ
- Red Hat JBoss Enterprise Application Platform
- PostgreSQL
- Red Hat JBoss Web Server
- Pentaho

Exact versions of each of the above are described in the standard documentation set accompanying each release of CMP.

For more information, see the *CMP Technical Architecture Overview*.

Support and, where required, licences for the operating systems, databases and other listed third party components are not provided as part of MDS Global CMP Product Support and Maintenance.