

This document is intended to give an overview of BT Control Centre, BT's M2M Service. Further technical detail can be provided upon request. BT is continually evolving its M2M Service and reserves the right to amend this document. Please check any specific details prior to contracting.

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1 About BT

BT is the UK's largest and most advanced digital communications company, delivering mobile and fixed communications services to consumers, businesses, government and the wholesale market.

We run the UK's biggest, fastest and most reliable mobile network, pioneering the UK's first superfast 4G mobile service in October 2012 and 5G in 2019. We serve over 30 million customers across our mobile, fixed and wholesale businesses and have the resources and expertise to deliver solutions for everyone.

BT has a heritage of innovation, and was born from two major mobile brands, Orange and T-Mobile, which joined forces in 2010. In 2016, EE was acquired by BT plc.

In the UK, our commitment to building Britain's best mobile network means that BT Control Centre, our M2M/IoT proposition, will become an integral part of consumers' digital lives. Our technological capabilities, commercial innovation and service flexibility make us the leading choice to connect everything from cars to cameras and from smart meters to street lamps.

Internationally, our relationships with network operators around the globe allow us to develop propositions with new business partners to provide connectivity on a worldwide basis.

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2 Propositions, Products and Services

As the UK's leading mobile service provider, BT are focused on providing the best connectivity and service experience to our M2M/IoT customers whether they are served by our direct or indirect channels.

Our connectivity proposition, BT Control Centre, facilitates flexible integration to our network and delivers the best network performance necessary for M2M/IoT applications. Our offer includes SIM products manufactured specifically for M2M/IoT deployments, network coverage both in the UK and globally, a management platform to control mobile connectivity and interconnect solutions to integrate the customer's own network.

BT Control Centre is delivered on multiple levels:

- Provision of a highly flexible SIM estate management platform – BT Control Centre
- Highly competitive commercial plans
- Delivery of self-care tools that allow efficient configuration, management and maintenance of connectivity solutions appropriate to your business needs
- Provision of a dedicated support organisation to assist you to establish and maintain a high quality of service to your customers and users.

Our goal is to be easy to do business with.

2.1 M2M specific solutions

BT's M2M/IoT solutions are based upon the following core elements which are described in more detail in the following sections:

- Global connectivity
- M2M SIM cards
- Customer rate plans and commercials
- BT's high capability, dedicated M2M platform, **BT Control Centre** which provides you with sophisticated self-care for your M2M subscription base

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- Dedicated M2M support

2.2 Value Added Services

BT's M2M/IoT Solutions are supported by the following elements and value added services which are described in more detail in this document:

- Connectivity from your data centre sites to BT's network with our **Data VPN** portfolio
- Access to SMS, data or voice services
- Private and/or public APNs
- AAA (RADIUS) configuration options
- Resilient interconnect
- Bulk SMS delivery through **M2M Control Centre** or **Third Party Gateway (TPG)**

Note: These value added services are provided under separate commercial agreements.

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3 BT Control Centre Solution Elements

3.1 Global Coverage¹

Through our global network of over 600 partners in 204 countries and territories, you can be sure of being connected around the world.



BT Control Centre uses the EE network, which is the UK's largest mobile network operator, with in excess of 30 million retail customers

EE is continually investing in its 4G network, deploying 4G infrastructure. In addition, in 2019, EE launched 5G and continues to roll out coverage across the UK.

¹ Correct at the time of writing – the shape and scale of EE's roaming global network will change from time to time. Please qualify any specific coverage requirements in advance of contracting.

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3.2 M2M SIMs (Subscriber Identity Modules)

BT has a portfolio of M2M-specific SIMs that are fully compliant with international standards and are applicable to the wide range of M2M applications deployed in current markets.

3.2.1 Specification and performance

BT's M2M SIMs are specially designed for use in demanding M2M applications. They are "ruggedized", have higher data capacity and greater heat resistance than "standard" SIMs. We supply 4G/5G M2M-specific SIMs as standard to ensure they can deliver the connectivity and reliability needed by M2M devices and applications.

BT can provide a list of M2M Accredited Devices. Such devices have undergone network assurance testing to confirm performance of the SIM and device against network protocols. Although we recommend you use an M2M Accredited Device, you must still complete your own end-to-end testing of your M2M solution to ensure that all hardware and software function and do not interfere with the performance of the network. We recommend that your end-to-end testing includes testing your M2M solution in the actual environments you intend to deploy the M2M solution into, especially if they involve unusual operating circumstances. Examples of unusual operating circumstances would be:

- Embedding/setting SIM/devices in resin or concrete
- Operating in close proximity with sources of microwaves
- Frequent polling, i.e. every second

BT cannot guarantee access to the network as environmental conditions can have significant impact.

All of BT's SIMs specified for use in M2M and IoT applications have specifications which support as a minimum:

- Temperature range from -40° C to +105° C
- Minimum guaranteed 500,000 write cycles at +25° C

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- Resistant to vibration
- Resistant to corrosion (saline environment, humidity)

Detailed specification of our M2M SIMs is available on request.

3.2.2 SIM Portfolio

A range of physical form factors are available to meet device developer needs:

| | 2FF | 3FF | 4FF | VQFN8 |
|------------|--|--|--|---|
| Format | Card – 'Standard' | Card – 'Micro' | Card = 'Nano' | Surface mount chip |
| Dimensions | 15 x 25 mm | 12 x 15 mm | 8.8 x 12.3 mm | 5 x 6 mm |
| Notes | Reinforced plastic supports more rigorous environmental conditions | Reinforced plastic supports more rigorous environmental conditions | Reinforced plastic supports more rigorous environmental conditions | Compatible with surface-mount "pick and place" production process SIM is soldered in the device Supports more rigorous automotive requirements in terms of environmental conditions (temperature, vibration, corrosion, shocks) |

3.2.3 Packaging and Delivery

For 2FF ,3FF or 4FF SIM cards:

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- SIMs can be ordered in any quantity:
 - above 200 to a single address for delivery outside the UK,
 - above 50 to a single address within the UK.
- The SIM number is printed on the SIM card to facilitate SIM installation and management

For VQFN8 SIM chips:

- SIMs are delivered on reels of 500 units (orders must be in multiples of 500)
- A SIM reader is also required

SIMs can be ordered on the BT M2M management platform, BT Control Centre, and each order will be shipped directly to the customer specified delivery address.

BT is usually able to fulfil SIM orders within 7 working days; for large orders, a longer lead time may be necessary.

SIM orders are subject to BT standard SIM ordering processes and terms, more detail can be provided on request.

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3.3 Service configuration

3.3.1 Bearers available via the BT Control Centre

- **Packet switched data (PSD):** Mobile applications usually use Packet Switched Data technology to transfer data from machines/modules to servers. You can either use a dedicated public APN for M2M or private APN's can be provided.
- **SMS:** This offers true 'push' and can be used in its own right where the amount of data is relative small and for messaging, or used as a back-up for PSD. SMS has also historically been used for device wake up procedures.
- **Circuit Switched Data (CSD):** Available on request for Advantage feature level. Ideally suited where infrequent communications are required with remote devices which would otherwise present issues with PSD. Like SMS, CSD offers true 'push'. Unlike PSD, once the circuit has been established there is a guaranteed data rate of typically 9,600bps.
- **Voice:** Available on request. Mainly used for alarm applications with M2M. Note: Integration with value added voice services (e.g. voicemail) is not supported.

Connections to these bearers can be made using BT Control Centre, both in the UK and when roaming globally².

In order to allow you to flexibly manage your SIM base, provision of service appropriate to the SIM lifecycle can be configured (and is further described in the following sections).

BT is focusing future investment on its 4G and 5G network. The EE network is evolving, and support for technology may be withdrawn with notice to customers.

² Roaming services are subject to implementation of appropriate roaming agreements

3.3.2 4G and 5G -LTE service

To access 4G and 5G -LTE services, a 4G/5G enabled SIM Card and appropriate device is required:

- Access and use of the BT network, where available, is based on 4G-LTE Releases 8 and 9 of series 36 as implemented on the BT network
- Services are provided at QCI 8 (Quality of Service Class Identifier)
- We may provide 4G-LTE and 5G services using different spectrum frequency ranges. Spectrum frequency range 800MHz is currently not available to BT Control Centre customers, however this may change in future
- BT Control Centre 4G-LTE and 5G-LTE is only available for data
- Data speeds are capped per SIM to 250 Mb/s upload and download speed.
- End users that are permitted to make voice calls on other bearers will drop back to a circuit switched bearer which is known as Circuit Switched Fall-Back (CSFB)
- Irrespective of whether LTE enabled equipment is being used, data services will not be available if voice and data services are used simultaneously
- Future evolutions of mobile network service are not within the scope of BT Control Centre unless otherwise notified by BT

BT Control Centre is offered on the basis that VoIP is barred and we reserve the right to suspend or disconnect subscriptions which use VoIP. If you require VoIP, you must ask for pricing on this basis before contracting.

4G roaming services are available wherever possible, but may not available globally in all markets

3.3.3 Consultancy Services

Prior to and post contract signature, technical consultancy services may be provided to you on an ad-hoc basis to optimise the mobile communication solution.

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Although BT's M2M offer doesn't cover device hardware and customer applications, these elements are vital to consider when defining the tailor-made proposal to ensure that the end-to-end solution functions correctly.

Our consultation can assist you in:

- Understanding your network integration requirements
- Assessment of coverage of your site(s) or your customer site(s)
- Assessment of network usage behaviour generated by the customer application(s)
- Defining a tailor-made offer based on required services and anticipated usage

3.4 M2M Management Platform – BT Control Centre

The BT Control Centre platform allows you to manage your business, providing complete control and offering unrivalled flexibility from the beginning. It supports:

- ordering and allocation of SIMs - you can place orders for new SIMs, specifying the SIM type, quantity and delivery address
- allocation of service for device testing during manufacture – a predefined package of use restricted to territories of manufacture is available
- automated or manual lifecycle management on a bulk or individual SIM basis. You can control the transition from inventory through activation to retirement, including periods of temporary suspension
- managing accounts and subscriptions (creation, activations, in-life and termination)

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- re-rating of subscription plans for end customers – Retail Rate Plans (optional - subject to contract with BT)
- Generation of preliminary invoices
- transmission of control/update SMS to individual or groups of devices (charged as per contract structures)
- investigation of SIM performance incidents
- generation of multi-faceted reports to assist business intelligence that can be accessed either through the web interface, BT Control Centre APIs or FTP download sites (chargeable option subject to contract with BT)
- management of user login accounts which provides a mechanism for access control to features and also facilitates an audit trail

Control of the SIM base can be achieved using a web-based, self-service interface or by your own CRM systems via BT Control Centre APIs.

Full details of system functionality can be found in the User Guides and Specifications published on the BT Control Centre web interface.

3.4.1 Web interface

The web interface is a secure web application by which you can access BT Control Centre using a dedicated login and password. Access to the portal is simple as only an internet connection is required. Once authenticated with the unique login and password identities, your staff can proceed to manage its entire M2M base.

The web interface provides a complete solution for you to manage the features outlined within this document (and further detailed in relevant user guides). Each user is granted a predetermined role which grants them visibility and access to those functions appropriate to the tasks they need to execute and also provides checks and balances to maintain correct operational procedures.

3.4.2 API interface

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In addition to the web interface, BT Control Centre is accessible through IT Interfaces (APIs). You can manage your business using your own IT systems interfaced directly with BT Control Centre APIs. When using the APIs, you take on the responsibility for managing the current state of your subscriptions at all times.

Example functions that can proceed via the APIs include:

- querying of SIM attributes individually or in bulk
- querying of SIM session information
- configuration of SIM attributes (states, plans, etc.)
- reset device
- send SMS to device(s)
- retrieve rate plan information
- manage rate plan allocation
- retrieve usage information
- retrieve invoices
- create and manage user accounts
- query business automation alert activity
- push notifications to customer systems pertaining to business automation

Full details of API function calls are contained within the API Integration documentation (accessible via the BT Control Centre web interface – Resources section).

3.4.3 SIM Lifecycle

The manner in which SIMs are utilised can vary depending upon the product lifecycle. To assist optimal configuration of services, the BT Control Centre will reflect and account for typical SIM 'states', provisioning services and adjust billing appropriate to applicable conditions. Examples of such states include:

- Trial – the SIM is provisioned with a predefined package of usage to allow prototype/concept development. An up-front charge and billing of overage usage may be applied
- Test Ready – the SIM is provisioned with an optional predefined package of usage (subject to contract) to allow device test at manufacture.

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Typically the usage allocation will be included within the subscription plan and may be limited by usage levels or time period

- Inventory – the SIM is available for deployment and subsequent activation (either manually or automatically under contractual commitments)
- Activation Ready – the SIM has been placed in a state that will allow autoactivation whenever the device is powered up
- Activated – the SIM is fully activated with all services defined within the BT Connect contract and usage will be charged accordingly
- De-Activated – the SIM is suspended (temporarily) from accessing communication services and will not generate chargeable usage. Subject to contractual terms, you may be billed for subscription type charges
- Retired – the SIM has been retired from active use. After a predefined period, SIMs will be purged from the BT network

The current 'state' of the SIM can be controlled manually, via zero-touch provisioning flows or through business automation rules (which are explained in the following sections).

3.4.4 Communication services

BT Control Centre will provision and control the communication services that each account and subscription can access throughout the SIM lifecycle, enabling solutions to be tailored to your needs. Specifically the communication plan will address the following:

- Bearer services that can be used for transfer of information between the customer application server and device (and vice versa) e.g. packet switched data (PSD), SMS, voice or circuit switched data (CSD)
- Access point names (APNs) which allow access between BT's mobile network and a customer's private network. This will support both public and private configurations
- Roaming restrictions which dictate which territories can be utilised
- IP address management - whether static or dynamically allocated from Control Centre

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Allocation of communication services appropriate to your deployments will be agreed in the BT Connect contract.

3.4.5 Rating and Billing

Invoices (before local taxation) will be published for all accounts on the Control Centre each billing period. If you are granted reseller rights (retail rate plans), you will be provided with invoices for each of your customer accounts, however you are solely responsible for invoicing your customers.

Rounding of usage activity (that is applied prior to rating) will be configured to comply with regulatory guidelines and confirmed by contract.

Invoices will provide the following information:

- Subscription charges
- PSD, SMS, CSD and Voice service overage charges
- Activation charges
- Other charges (including but not limited to contractual commitment variances)
- Discounts where applicable
- Roaming related charges

If you have been granted reseller rights with retail rate plans, the published invoice for your customers will reflect the reseller rate plan metrics.

Final invoices, including local taxation, will typically be emailed to you within 10 business days following the end of the billing cycle.

3.4.6 SMS Application

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To support the use of SMS to update and control devices, BT Control Centre provides the capability to create and send SMS messages for transmission to individual or groups of SIMs.

Messages may be created from within the web interface or transferred from customer systems via the APIs.

This activity will be rated in accordance with the agreed Rate Plan.

3.4.7 Business Automation

To increase automation of SIM lifecycle management, BT Control Centre provides zero touch provisioning of service by automatically detecting:

- a) when a SIM exhausts any pre-allocated test usage allowance, or
- b) when a SIM connects to the network for the first time for active service,
or
- c) completion of a prepaid contract of usage

and subsequently affecting the transition of the SIM to an appropriate lifecycle state for ongoing activity.

If required, to assist you in optimising management of your SIM base, BT Control Centre can also offer business automation tools which can monitor SIM behaviour against customer defined rules, alert BT, devices or applications of defined events and automatically adjust service configuration appropriate to the current conditions. For example, you may wish to monitor:

- Lifecycle state transitions to confirm your application is becoming active
- Subscription completion (due to time or usage exhaustion)
- Abnormal usage patterns compared with projected behaviour
- Registration on roaming networks
- SIMs transferring to different devices (perhaps for fraudulent reasons)

3.4.8 Business Insight

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In addition to business automation capability which can provide event driven insight to SIM base activity, if customer requested and contracted, BT Control Centre can also provide additional reporting capabilities to assist you in both ad-hoc assessment, scheduled reporting and trend analysis.

Detailed information relating to individual SIMs or the complete account base can be accessed via the portal UI, queried by your CRM systems via the BT Control Centre APIs or extracted to the your data warehouse for additional processing.

Configuration of custom extracts is an option subject to contractual agreement.

3.4.9 Reporting

Reporting is an additional chargeable feature that can be chosen by customers to use BT Control Centre to access a comprehensive reporting functions which allow you to obtain important operational information. The following elements are currently generated:

- Customer Account details
- Financials and Invoicing
- Base statistics – current and new
- Subscription attributes, changes and charges □
- Usage (data, SMS, CSD, voice)

- Rate Plan attributes
- SIM states and changes
- Carrier networks utilised

Information that is reported through the portal UI, can be queried by you and results exported in both CSV and Excel formats for further data analysis.

3.4.10 Diagnostics and Troubleshooting

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At various stages of its life, a device may encounter problems which will be reflected in the service usage attributed to the allocated SIM. BT Control Centre is uniquely positioned to monitor such events and provides tools to alert you, provide insight into a SIMs recent activity and to isolate potential problems for further investigation.

Specific capability includes:

- A Diagnostics Wizard which summarises, via a UI dashboard, key service attributes and provides tips for troubleshooting in the event of highlighted issues
- A Spotlight application which provides detailed visibility of a SIM's network activity including for example - connection establishment, access location, and successful delivery of SMS
- SIM communication plan and rate plan configuration via the web portal UI against which integrity of SIM provisioning state and usage can be confirmed

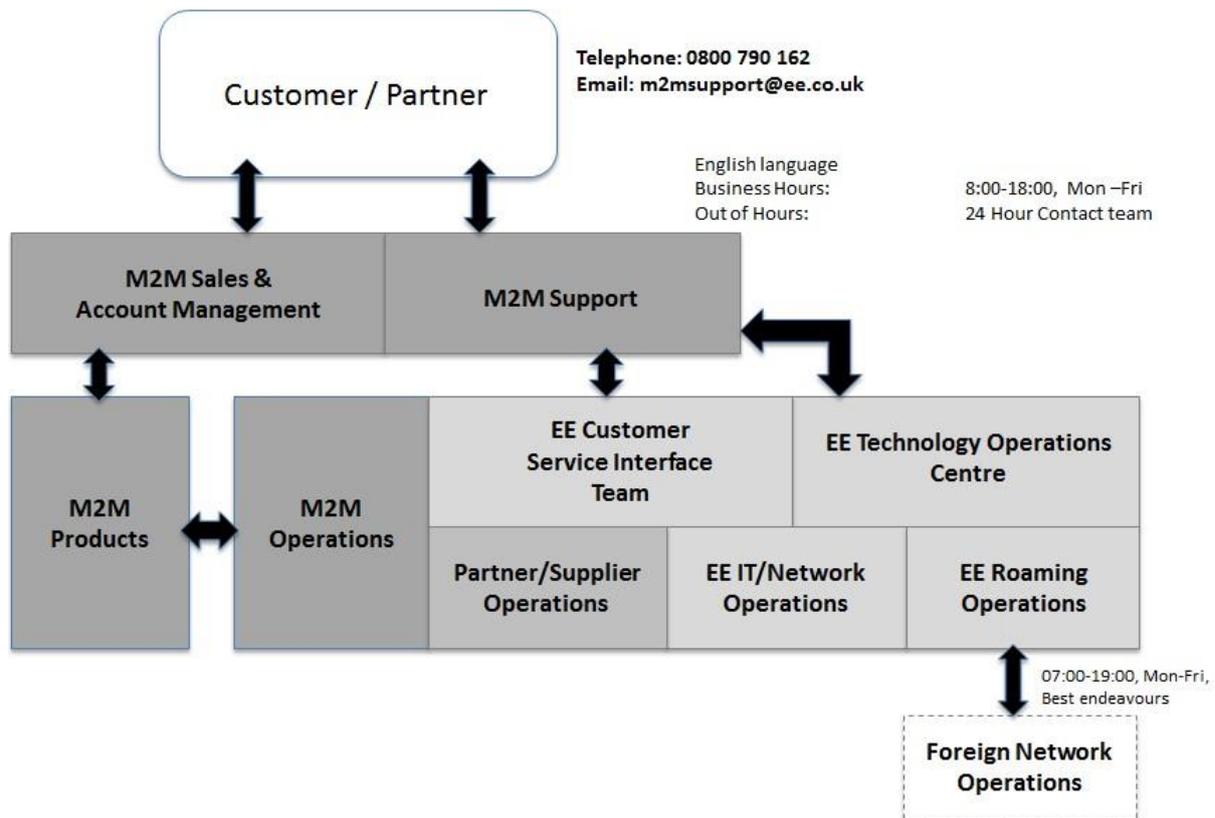
3.5 Dedicated M2M Support

BT Control Centre is a self-service platform and provides you with the ability to provision, monitor and diagnose SIM estate behaviour without recourse to BT. **It is expected that this should and will be your first level of incident management.** If you require a bespoke support package this may be available subject to agreed terms.

In the event that you do require additional BT assistance, we have an established and dedicated M2M support team to assist with all M2M activities. The aim is to provide a direct interface at the technical level for all operational matters through the M2M Support team, and a contractual and management interface through the Account Manager (and Service Manager where allocated by contract).

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Change above to BT

- The support model is team-based, providing contingency and resilience
- The M2M Support team is the first point of contact for support, and is responsible for identifying and engaging the appropriate BT resources (second-level support)

3.5.1 First level support

- The M2M Support Team provides first-level support, and referral to secondlevel support where required. The M2M Support Team has direct access to network and IT diagnostic tools to resolve common faults and agents have full access to all support platforms and tools.
- Access to the M2M Support Team is via e-mail and phone. During business hours (defined as 08:00-18:00 Monday to Friday UK local time, excluding

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statutory holidays) the M2M Support Team is the single point of contact for your support requests. Outside these hours, you will be given a dedicated out

- of hours number to call. An M2M Support Team representative will aim to contact you within 30 minutes to assess and assign an appropriate priority level to the incident. High priority incidents will be processed immediately; lower priority level incidents will be assigned for next working day investigation. In all cases and at all times the support language used is English.
- Emails sent to the M2M Support team during business hours are processed on the day received. Emails received outside of these hours are processed during the next working day; hence urgent outages should be notified via phone.

3.5.2 Second level support

The M2M Support Team will engage with BT's Technology Operation Centre and Customer Service Interface team to request second-level support from its internal operations teams, suppliers and partners as required.

All incidents impacting the BT network, or services provided by the network, are assigned an incident priority. This priority reflects the impact and urgency of the incident and drives resolution times and call out periods³.

Troubleshooting tickets are raised for all incidents that require second-level support to assist management and performance tracking.

- Second-level support is provided by the following key technology operations:
 - BT Network Operations
 - BT IT Operations
 - BT Roaming Operations

³ For further information on SLAs and incident priorities, please refer to the EE M2M Customer Service Level Agreement and Support Model

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- Roaming Partner Operations
- Platform/Product Partner Operations

3.5.3 M2M Service Management

- Service Management is responsible for all operational escalations
- The Incident Management Centre, part of the Service Management Centre, is responsible for progress and tracking of all trouble shooting tickets until resolution
- Service Management have the following service review structure:
- Monthly and bi-monthly reviews (subject to contractual commitment)
- Quarterly reviews available on request
- Key performance metrics captured and reviewed □ Network and Service roadmap discussions

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4 Relevant Value Added Services

4.1 Connectivity from the customer site to BT's network

To achieve connectivity to the BT network and access to the various bearer services, several configurations can be implemented depending on your requirements, such as the following:

- Data interconnect – Data VPN
- Bulk SMS interconnect – M2M Connect and Third Party Gateway (TPG)

4.1.1 Data VPN

Customer access to BT's mobile data network is provided to support: □

- Delivery of application data to customer devices
- Deliver of application data to customer application servers
- Alignment of IP address management mechanisms
- Alignment of Access, Authentication and Accounting mechanisms

Access to BT's mobile data network is facilitated by our Data VPN product portfolio which supports a range of functionality. This capability, which is subject to separate contractual agreement, is specified in the Data VPN General Specification which can be obtained via your Account Manager.

Leadtimes for router repair may be next working day dependent on router specification and location.

4.1.2 M2M Connect

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M2M Connect is a messaging platform that provides a simple, web-based interface to send and receive data via SMS and/or GPRS. It can drastically reduce M2M solution deployment costs, and simplifies both monitoring and control of devices.

M2M Connect requires no expensive equipment or development; VPNs and leased lines are not required. It provides a single, simple-to-use access point to devices located globally and is capable of supporting connection volumes ranging from tens up to many thousands of connections. M2M Connect works with the customer's application to poll for incoming messages and sends out messages via SMS or GPRS.

M2M Connect is accessed via an SSL connection via the web using SOAP (Simple Object Application Protocol). M2M Connect for text messaging supports delivery receipts, concatenated messages, message validity period, alpha-numeric source addresses as well as text and binary modes. For GPRS there is no requirement for static IP addressing as data will be addressed to the mobile number of the remote device as M2M Connect takes care of the IP addresses.

You can either write your own messaging software using the M2M Connect User Guide or alternatively, BT can introduce third party software companies to develop messaging software on your behalf.

M2M Connect is highly resilient and located in a secure environment. All device communication is encrypted before being sent over the internet, reducing the need for any device end encryption.

M2M Connect is an integral part of the BT Connect product suite which is utilised where messaging functionality is required but you do not wish to develop your own full solutions or use more complex protocols for text messaging such as SMPP (Short Message Peer to Peer).

Additional detail is described in the M2M Connect User Guide.

4.1.3 Third Party Gateway (SMS)

Access to BT's SMS network via the Third Party Gateway (TPG) is provided to support:

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- Delivery of application data to customer devices (MT-SMS)
- Delivery of application data to customer application servers (MO-SMS)

Access to the TPG, which is subject to separate contractual agreement, is summarised in the M2M Developer Guide document with additional technical detail specified in the TPG Interface Specification (for XML/SOAP access) and the TPG SMPP Interface Specification.

4.2 Advantage and Essential Feature sets

| Capabilities Included in Essential | Capabilities Included in Advantage |
|---|---------------------------------------|
| Diagnostics | Diagnostics |
| SIM Ordering | SIM Ordering |
| Basic SIM lifecycle management | Full SIM lifecycle management |
| Single rate plan: Monthly Fixed Pool or Monthly Flexible Pool Rate Plan. Rate Plans cannot be changed within the Billing Cycle but can be changed for the start of the next Billing cycle | Multiple Rate Plans, types and zones |
| Data Service Provisioning | Data, SMS, Voice Service Provisioning |
| API access up to 1 TPS/Account | API access up to 5 TPS/Account |
| All applicable REST APIs. | All REST and SOAP APIs |
| | Additional Automation |

5 Devices

Devices used with BT Connect should comply with ETSI, 3GPP and GSMA international standards for mobile networks technologies deployed by BT (and other mobile operators).

When determining your device solution, you should complete full testing of devices to ensure no disruption occurs to the network. Market availability of proven modems and modules can simplify this process, however the complete device design should demonstrate appropriate behaviour. Some considerations on designing for device behaviour is captured within the M2M Developers Guide (available on request).

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When procuring devices, you should also consider evolution of the network. We recommend that devices are selected which can be updated over the air and which utilise software that can be updated for use with future network generation standards. BT is not under any circumstance liable for devices and loss of connection due to network evolution.

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July 2021