Charge Code Application for Communication Cabinets

1.1. Purpose

Application to obtain UMSUG approved charge codes for Openreach communication cabinets.

1.2. Summary

Openreach's roll-out of fibre to the cabinet (FTTC) is fundamental to the government's desire to see a connected Britain using high speed broadband capability[1]. These cabinets are used by Openreach to wholesale to all communication retailers under the 'open access' obligations to provide communications to customers.

The application relates to modern equipment produced by more than one manufacturer. The physical cabinet design is similar, although the number of customers supported by each cabinet is scalable by adding between one and six cards. This charge code application is for fourteen charge codes to reflect this simple modular approach whilst retaining appropriate settlement accuracy.

In parallel to this application to UMSUG, discussions are commencing with Distributors to seek agreement to move future cabinet installs to unmetered connections rather than further metered connections.

As Openreach use the same equipment throughout the country, the BSC unmetered arrangements require an application through UMSUG to agree a series of nationally agreed charge codes.

2. Background

Openreach's Superfast Broadband roll-out plan

Openreach is rolling out two solutions as part of their super-fast broadband deployment:

- Fibre-to-the-cabinet (FTTC) where new fibre-optic cables are deployed to the green road-side cabinets and our copper lines are used to deliver super-fast broadband over the final distance to homes and offices.
- Fibre-to-the-premise (FTTP) where new fibre-optic cables are deployed the whole way to the home or office.

This unmetered supplies application is for FTTC

Story so far; our rate of fibre deployment continues at pace….

- £2.5bn investment to roll-out fibre to two-thirds of UK premises by end of 2014
- Over 30,000 streetside cabinets deployed to date.
- Among the fastest and largest commercial roll-outs in the world
- Further BDUK deployment to reach the rural final third.

What's our strategy?

- Openreach supports the UK's government's vision of creating the best super-fast broadband network in Europe by 2015 and we have pledged to invest £2.5bn to deliver super-fast fibre broadband to two thirds of the UK a year ahead of target by the end of 2014. Installing up to c.20,000 cabinets per annum.

[1] www.openreach.co.uk/orpg/home/products/super-fastfibreaccess/fibretothecabinet/fttc.do

- Openreach has committed to working with the government to find ways of delivering fibre to the remaining third of UK homes and businesses. Our plans are ambitious and we're continually looking at ways to extend the fibre footprint, and bring the benefits of broadband to more rural areas as fast as possible.
- Bringing fibre to the UK is a huge challenge and one of the biggest engineering programmes underway in Europe today. To put it into perspective, we are building the equivalent of the fibre network in Singapore every quarter.
- Over the course of the programme Openreach are installing c.20,000 cabinets pa, connecting 200,000 distribution points, enabling over 1,000 exchanges and laying over 50,000km of fibre.
- And we're deploying at twice the pace of Deutsche Telecom, AT&T, Verizon & Belgacom and more than three times the pace of peers in Japan and Korea.

Superfast Broadband Rollout is high on the UK government's agenda…

- The Government has an ambition for Britain to have "the best superfast broadband network in Europe by 2015"
- It has allocated £530m – during the lifetime of this parliament - public funding to bring superfast broadband to rural areas
- The process is administered by a team with the Department for Culture, Media and Sport (DCMS) known as Broadband Delivery UK (BDUK)[2]
- BDUK has allocated the funding to every English county and the devolved nations
- The counties and nations are now running procurements to select a telecommunications provider to deliver fibre broadband to those areas that are not commercially viable for the private sector to invest alone
- **The Government and Openreach are activity working with the DCMS to streamline cabinet rollout; unmetered supplies and amended town & county planning application.**

[2] https://www.gov.uk/broadband-delivery-uk

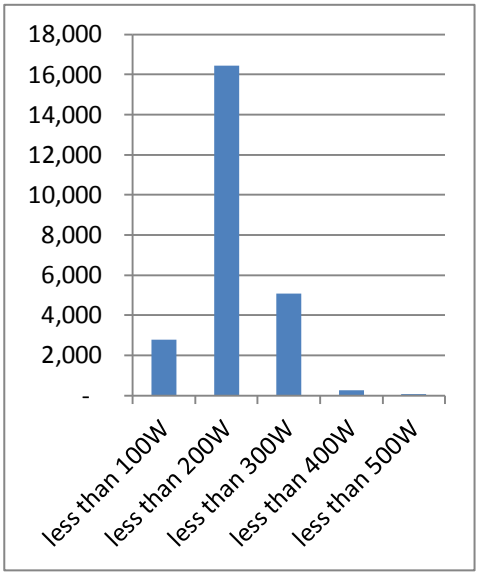
3. Unmetered criteria

3.1. Size of load

When Openreach commenced cabinet installation in 2009 there was uncertainty about cabinet electrical consumption. At that time there was resistance from some parts of the electricity industry to provision of unmetered connections. Due to the significant political importance of the programme, the installation programme was commenced using metered connections.

Openreach now have data on billed power usage over a 3 year period. Using the monthly meter reading data from 24,572 cabinets, shows that none are above 500W while ***99% of cabinets have an average demand below 300 watts***.

Watts/hour	count of cabinets	
less than 500W	53	0%
less than 400W	245	1%
less than 300W	5,068	21%
less than 200W	16,434	67%
less than 100W	2,772	11%
total	24,572	100%



The Electricity (Unmetered Supply) Regulations 2001[3] and the related NMO Guidance[4] issued in 2012 makes it clear that predictable loads below 500W are eligible to an unmetered supply if they meet certain criteria. The BSC requirements are that settlements remain as accurate as if the unmetered equipment was metered.

3.2. Predictable consumption

Predictable consumption is the key criteria in the Regulations.

The communications cabinets are a continuous load. From an electrical perspective the key features are:

- Equipment loading is a continuous flat profile, throughout the day/week/year
- There are no frost/condensation heaters installed in the cabinets
- There are cooling fans associated with the power supply, but these run continuously. One model (ECI M41) includes a temperature controlled fan rated at up to 20W.

The architecture of each cabinet is:

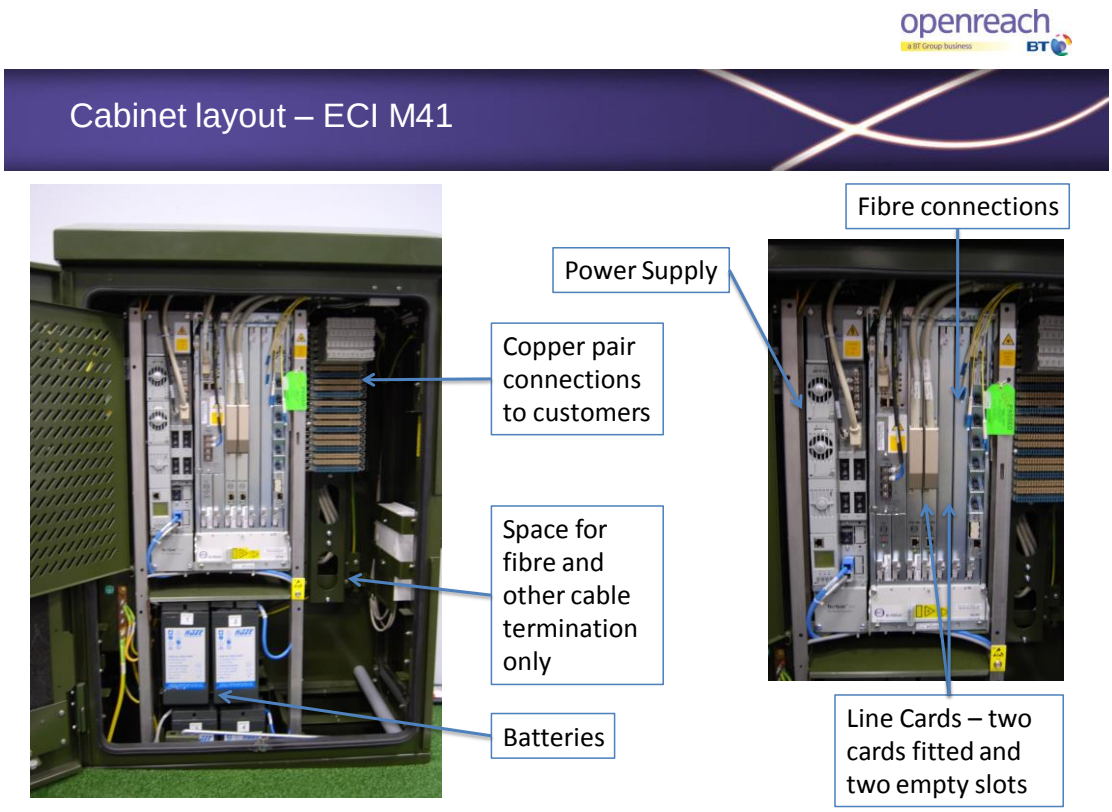
- **Base load** - power supply unit (including a battery charger), fans, wide area network fibre connection
- **Incremental load** - network card(s), added incrementally with a minimum of one card and maximum of four or six cards (dependent on cabinet model) within each cabinet.

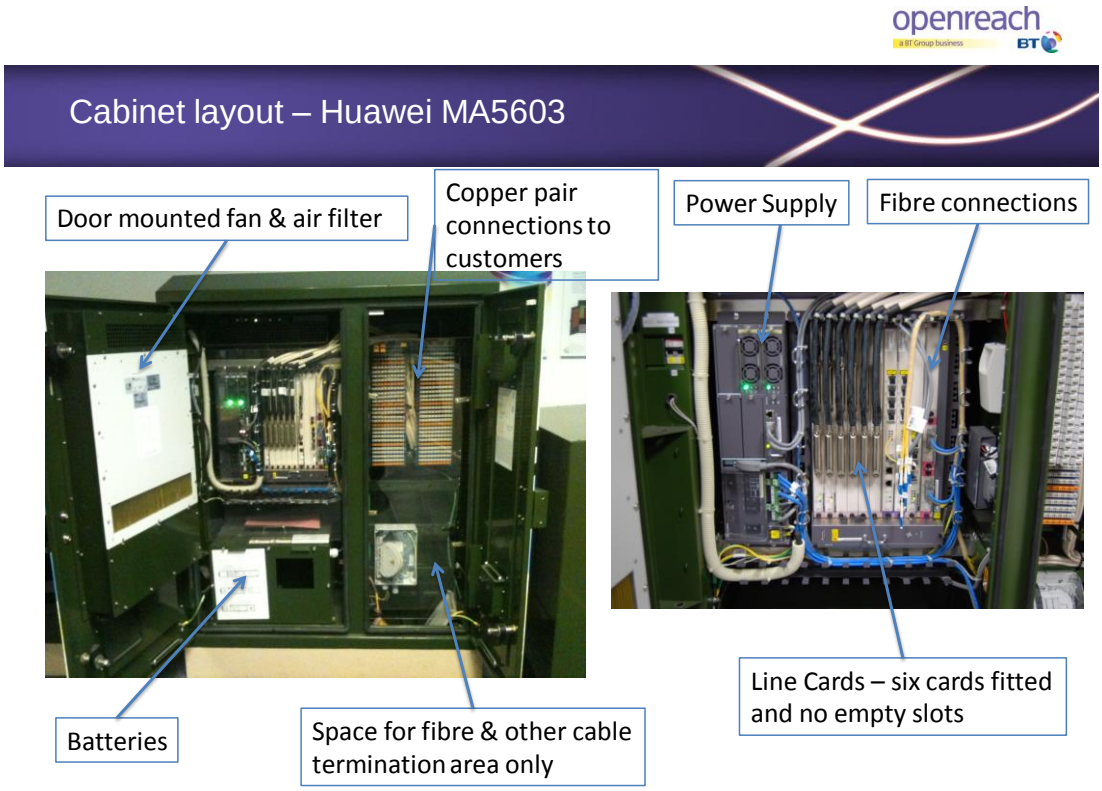
The power supply unit includes an Uninterruptable Power Supply (UPS). The UPS battery is designed to maintain the cabinet operation for at least 30 minutes during a temporary loss of

[3] www.legislation.gov.uk/uksi/2001/3263/contents/made
[4] www.bis.gov.uk/nmo/gas-and-electricity-meters/Unmetered-supplies-of-electricity

mains power. The 'trickle charge' load is included within the 'average continuous loading' described below. The small temporary increase in power consumption to recharge batteries after a power outage is compensated by the lack of power consumption during any infrequent power outage.

To appropriately reflect the cabinet consumption, the proposed charge codes are based on cabinet model and the number of cards installed. All cabinet designs are of a common layout, varying slightly by manufacturer and cabinet size.





4. Operational Review

4.1. Costs of Metering

Since the programme commenced, there are now over 30,000 cabinets installed with metering. The programme for 2013/14 is intending to install a further c.20,000 cabinets. Any time delays associated with metering have a significant impact on the speed of cabinet deployment. It is estimated that by installing a meter, that an additional ten days is incurred in the over deliver time of each cabinet. With c.450 cabinets being installed per week, this equates to an additional 450 days delay each week.

A review of the programme has identified significant time, cost and logistics savings though moving to use unmetered connections for these small and predictable loads. Logistics savings simplify the process significantly leading to time and cost savings for all parties. Cost savings will be reflected in reduced costs for high speed broadband services and faster roll-out of broadband services will lead to improved service to customers. Distribution Network Operators (Distributor) will also benefit from a reduced administration cost for generating c.450 new MPAN registrations each week.

4.2. Installation impact

- Administration of applying for an MPAN for each cabinet debate/agree roadside address details which are complicated as they are not associated with a particular premises (Openreach & Distributor)
- Obtaining supplier appointment and appointing agents for each individual cabinet (involving Openreach, Distributor, Supplier, meter operator, data collector and data aggregator)
- Metering installation (involving Openreach and meter operator)
- Installing remote meter reading capability (involving Openreach for provision of phone line, meter operator & data collector)
- Logistics of scheduling meter installation following electrical connection but prior to cabinet communications equipment commissioning (involving Openreach, meter operator).
- Resolving issues and consequences following from any part of the structured process not following exactly as intended. (involving all parties, particularly customers when service provision is delayed)

It is estimated the above process can add two weeks to the installation process, when it fails it can take many weeks to resolve

4.3. On-going operational costs

- Agents costs of Meter Operator, Data Collector and Data Aggregator
- Communications line rental (Openreach are required to pay published rates)
- Identification & resolution of meter and/or communication failures
- Supplier standing charges, including Distributor DUoS standing charges
- On-going meter reading/data collection/site inspection, Supplier licence condition for visit every two years. Due to access control to cabinets, this has to be an Openreach accompanied visit.
- Invoice validation and administration which requires the invoice for each MPAN (x30,000) to be verified prior to payment

The additional on-going operational costs are commercial sensitive and not included in this document. Needless to say, the costs are material when multiplied across tens of thousands of connections.

4.4. Distributor Engagement

Under The Electricity (Unmetered Supply) Regulations, Distributors and the Supplier, need to agree to provision of an unmetered supply. Openreach's electricity Supplier, npower is supportive of this approach. In parallel to this application to UMSUG, discussions are commencing with Distributors to seek agreement to move new connections for cabinets to unmetered connections. The engagement will be progressive as the transition from metered to unmetered connections progresses across the country (subject to agreement). Part of this dialogue will include agreement to an unmetered supplies agreement.

4.5. Inventory Management

While not directly relevant to an application for a charge code Openreach has recognised the need to effectively and robustly manage an inventory of unmetered equipment. Further details are included in Appendix 1.

4.6. Other issues

If new cabinet/card designs are proposed in the future, then further charge code applications may be initiated. At this time, none are expected.

Within the cabinet space is limited. An objective of the cabinet design was to minimise the cabinet size to minimise any planning/environmental concerns associated with 'street clutter'. There is no space within the cabinet to accommodate other unrelated equipment. As an 'open access' provider any proposal to accommodate other equipment would have to be made to the telecoms community whilst maintaining the security and integrity of the cabinets. Openreach have no plans to accommodate any other parties' equipment within these cabinets.

5. Charge Code calculation

5.1. Approach

There are two manufacturers who provide equipment to Openreach, ECI & Huawei. Each manufacturer is required to minimise the energy consumption as part of Openreach environmental policies[5].

There are three designs of cabinet which can accommodate, up to 128, 256 or 288 customer lines, respectively. The planning activity to determine an acceptable FTTC cabinet location will inevitably require some cabinets to be located in a low customer density area, and others in high customer density areas. The modular design allows for a single card to be installed in low customer density areas, which may suffice for the lifetime of the installation. In higher customer density areas the initial installation may include a single card, and additional cards will be added as the customers connected to the cabinet increases. The Openreach policy is to initiate the installation of an additional card when the existing cards are 75% utilised. Openreach uses a system called LLUMS[6], primarily to monitor and report on the installation of each cabinet, known with Openreach as a DSLAM[7]. LLUMS is also used to monitor the customer growth and trigger the addition of further cards. LLUMS is therefore always kept up to date with the number of cards installed in each cabinet. These are the natural building blocks as the cabinet is loaded with additional customers over time.

A variety of options for charge codes was considered, including:

- A single charge code for each cabinet model – discounted as too broad a range of consumption, agreeing a mutually acceptable single 'average' value was thought to be unlikely
- A different charge code for each cabinet model varied to reflect the number of cards installed. This is the proposed approach as it provides a manageable granularity of inventory with acceptable range of consumption which can be simply audited.

The charge code application is therefore structured upon information from LLUMS, using the cabinet model and the numbers of cards fitted within the cabinet.

5.2. Information source

Openreach has manufacturers rating of equipment, which is effectively the maximum consumption that any cabinet could take. It is not appropriate to use this as the basis of charge codes as the meter reading history clearly demonstrates that this 'maximum design load' does not reflect the typical actual metered consumption used during the cabinets operational life.

With any equipment of this nature, the maximum design load and the actual typical will differ. In particular the battery charging peak load will be capable of fully charging a flat battery, whereas normal operation will be a trickle charge, similarly some of the fans do not operate continuously. Each cabinet included a power supply[8] for charging batteries and powering the communications equipment. The power supply power factor is 0.99.

The BSC arrangements generally seek a number of sample items to be tested in a formal laboratory environment and test data to be submitted. As a population of 24,000 cabinets are already installed and metered in a diverse range of environments right across the country this provides a large sample of 'real life' data upon which to base the unmetered values. So no laboratory test data has been obtained.

---

[5] www.openreach.co.uk/orpg/home/aboutus/environmentandsociety/csr.do
[6] LLUMS = Local Loop Unbundling Management System
[7] DSLAM = Digital Subscriber Line Access Multiplexer
[8] http://www.emersonnetworkpower.com/en-US/Products/DCPower/ensys_ACDCPowerSystems/Documents/NetSure%20211%20Brochure.pdf (model R48-1000)

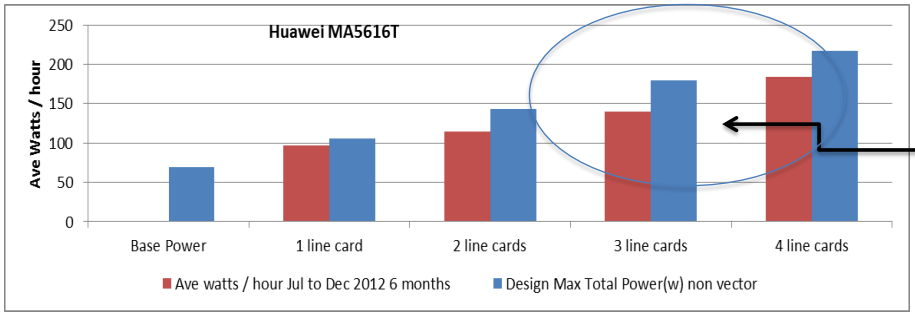
5.3. General comments

Settlement metered data from 24,000 metered cabinets from Jul-Dec 2012 has been used to calculate the consumption of each cabinet type. The line card data is from March 2013. The data is presented in a common format for each cabinet.

The detail below includes a chart showing the maximum design power together with the average measured power. The table shows the count of cabinets included in the sample. Cabinet are not installed without any line cards, so the design base power and the cumulative consumption the cards is included within the actual wattage for the cabinet described as 1 line card, 2 line cards, etc.

Historic power usage & design specifications – Huawei MA5616T

Sample size 3,637 cabinets, actual billed power usage Jul – Dec 2012 & Openreach Cabinet & card inventory records at March 2013



Cabinet max 128 lines capacity

Actual power demand (Red block) has been below Max design (Blue block) for all card types.

Huawei MA5616T	Vol lines	Design Max Total Power(w) non vector	Count of cabinets by card vols	Ave watts / hour Jul to Dec 2012 6 months
Base Power	0 lines	69		
1 line card	32 lines	106	325	97
2 line cards	64 lines	143	2715	115
3 line cards	96 lines	180	506	139
4 line cards	128 lines	217	91	184
		Total	3637	

97% of the cabinets with 1,2 or 3 cards installed.

The average watts used / hour is 115 for 2 cards, 139 for 3 cards.

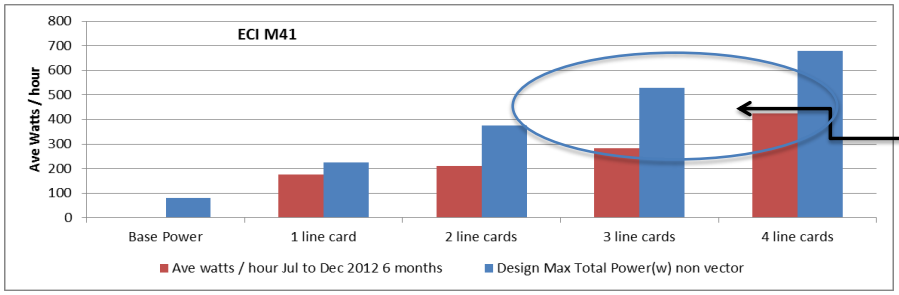
Actual power usage is significantly lower than the design Max power at all card installed increments.

Design Max at 217 watts is significantly below 500 watts

Capacity planning policy - additional card installation process is triggered when utilisation is above 75%

Historic power usage & design specifications – ECI M41

Sample size 7,732 cabinets, actual billed power usage Jul – Dec 2012 & Openreach Cabinet & card inventory records at March 2013



Cabinet max capacity 256 lines

Actual power demand (Red block) has been below Max design (Blue block) for all card types.

ECI M41	Vol lines	Design Max Total Power(w) non vector	Count of cabinets by card vols	Ave watts / hour Jul to Dec 2012 6 months
Base Power	0	80		
1 line card	64	225	5518	177
2 line cards	128	375	2166	210
3 line cards	192	530	35	283
4 line cards	256	680	13	424
		Total	**7732**	

99% of the cabinets with 1 or 2 cards installed.

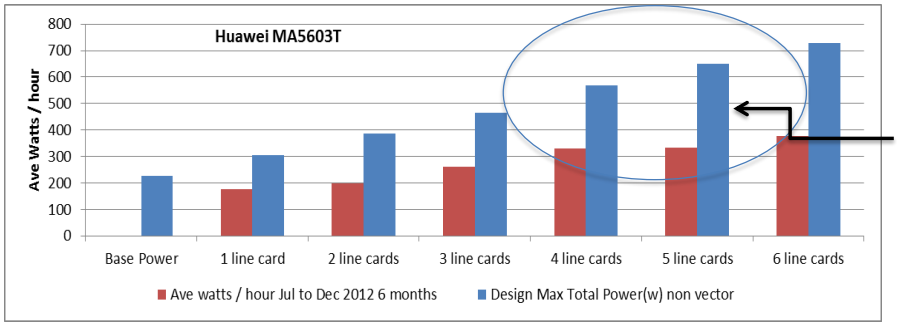
The average watts used / hour is 177 for 1 card, 210 for 2 cards.

Actual power usage is significantly lower than the design Max power at all card installed increments.

Capacity planning policy - additional card installation process is triggered when utilisation is above 75%

Historic power usage & design specifications – Huawei MA5603T

Sample size 12,995 cabinets, actual billed power usage Jul – Dec 2012 & Openreach Cabinet & card inventory records at March 2013



Cabinet max capacity 288 lines.

Actual power demand (Red block) has been below Max design (Blue block) for all card types.

Huawei MA5603T	Vol lines	Design Max Total Power(w) non vector	Count of cabinets by card vols	Ave watts / hour Jul to Dec 2012 6 months
Base Power	0 lines	226		
1 line card	48 lines	306	4188	177
2 line cards	96 lines	386	7916	197
3 line cards	144 lines	466	691	259
4 line cards	192 lines	569	164	329
5 line cards	240 lines	649	23	332
6 line cards	288 lines	729	13	378
		Total	**12995**	

93% of the cabinets have 1 or 2 cards installed.

The average watts used / hour is 197 for 2 cards & 177 for 1 card.

Actual power usage is significantly lower than the design Max power at all card installed increments.

Capacity planning policy - additional card installation process is triggered when utilisation is above 75%

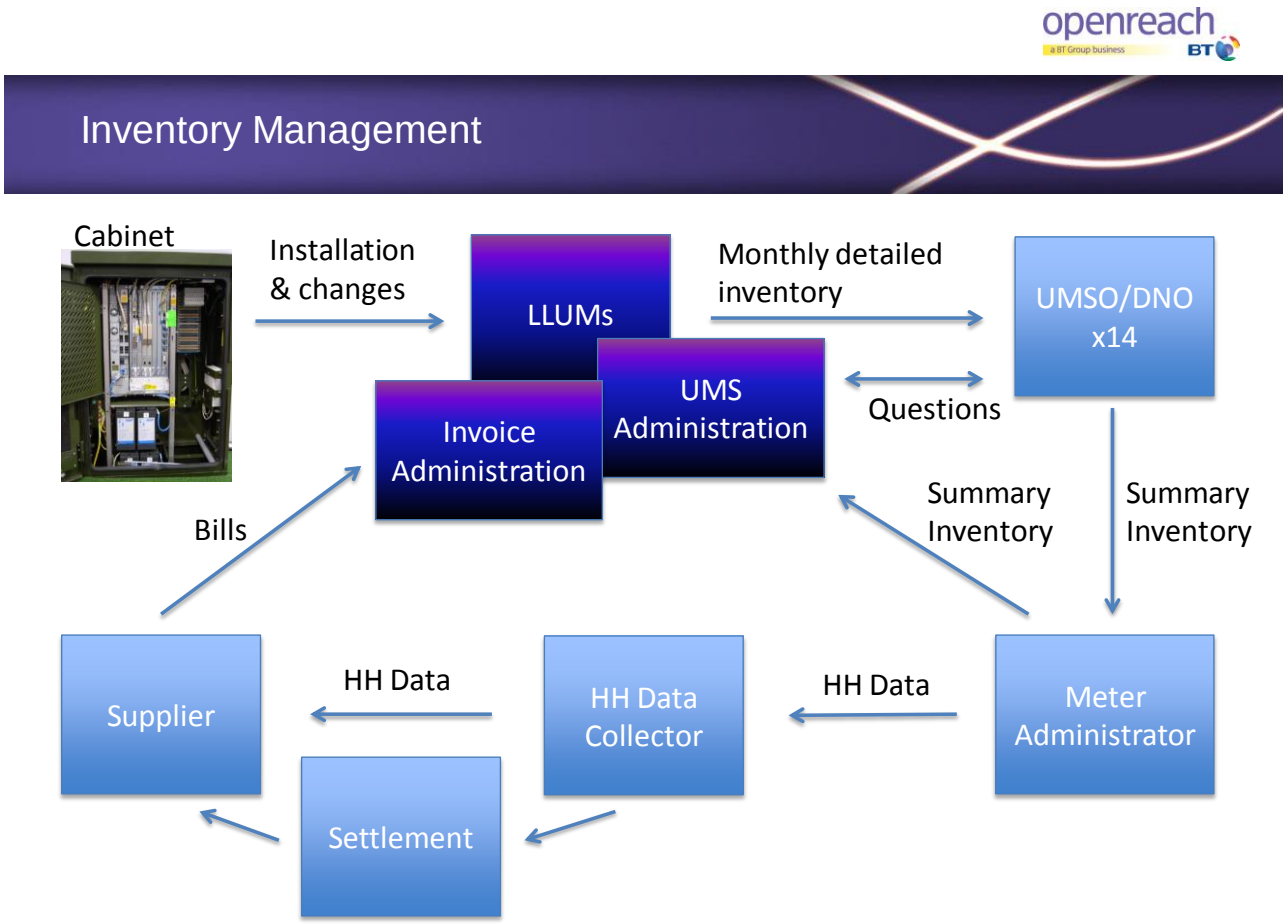
5.4. Proposed Charge Codes

Nominal Watts	Unit Description 1	Unit Descri ption 2	Company	Manufacturer's Designation	New Charge Code	Circuit Watts	Circuit VA	Circuit VAR	Circuit Power Factor
177	Cable Network Cabinets		ECI	M41 one card	813 0177 000 100	177	179	27	0.99
210	Cable Network Cabinets		ECI	M41 two cards	813 0210 000 100	210	212	29	0.99
283	Cable Network Cabinets		ECI	M41 three cards	813 0283 000 100	283	286	41	0.99
424	Cable Network Cabinets		ECI	M41 four cards	813 0424 000 100	424	428	58	0.99
97	Cable Network Cabinets		Huawei	MA5616T one card	813 0097 000 100	97	98	14	0.99
115	Cable Network Cabinets		Huawei	MA5616T two cards	813 0115 000 100	115	116	15	0.99
139	Cable Network Cabinets		Huawei	MA5616T three cards	813 0139 000 100	139	140	17	0.99
184	Cable Network Cabinets		Huawei	MA5616T four cards	813 0184 000 100	184	186	27	0.99
177	Cable Network Cabinets		Huawei	MA5603T one card	813 0177 000 100	177	179	27	0.99
197	Cable Network Cabinets		Huawei	MA5603T two cards	813 0197 000 100	197	199	28	0.99
259	Cable Network Cabinets		Huawei	MA5603T three cards	813 0259 000 100	259	262	40	0.99
329	Cable Network Cabinets		Huawei	MA5603T four cards	813 0329 000 100	329	332	45	0.99
332	Cable Network Cabinets		Huawei	MA5603T five cards	813 0332 000 100	332	335	45	0.99
378	Cable Network Cabinets		Huawei	MA5603T six cards	813 0378 000 100	378	382	55	0.99

Nominal watts are set to be equal to the circuit watts

Appendix 1 – Inventory Management

Historically, other parts of the BT Group, and other national unmetered equipment owners, have been criticised for failing to maintain an accurate inventory. This perceived weakness has been specifically addressed as part of the consideration by Openreach in the application for unmetered supplies. The BSC arrangements[9], the National Terms of Connection[10] and the document Managing Unmetered Energy Street Lighting Inventories (MUESLI)[11] all require an accurate inventory of unmetered equipment to be created and maintained. This 'trust' is fundamental to unmetered supplies arrangements.



Openreach already maintain a database (called LLUMS) of all FTTC cabinets. The database is initially populated at the planning stage, updated through the commissioning and continued operation. LLUMS already records the location details, equipment installation/commission dates and details of the equipment installed within each cabinet. This database is currently being modified to include the items required to support the unmetered arrangements, as a result certain extra fields are being added/amended:

- Distributor/Independent Distributor – identify the distribution network to which each cabinet is connected
- MPAN (when metered) or an unmetered identifier (used as filter to include in UMS inventory report)

The detail of the systems impact will be confirmed once agreement on the charge codes and any other miscellaneous requirements has been finalised.

[9] www.elexon.co.uk/reference/technical-operations/unmetered-supplies/
[10] http://energynetworksassociation.squarespace.com/
[11] https://www.theilp.org.uk/documents/unmetered-electricity/

A report will be run on LLUMS using the existing detailed inventory, and a conversion algorithm that will provide the agreed charge codes and quantities. Due to the expected rapid deployment of cabinets it is anticipated that the detailed inventory will be emailed to each Distributor each month. In future years if the rate of change declines it may be agreed that the frequency of reporting may also decline.

The monthly inventory report will reflect addition of new cabinets (included for first time), changes to existing cabinets such as adding/removing a card (change of charge code) and removal of cabinet (cabinet not included).

The submission of the monthly inventory report will be supported by a dedicated team within Openreach. This team will be the point of contact for Distributor where there are inconstancies or queries associated with the inventory submission.

The standard detailed inventory format is defined in the Operational Information Document[12]. The following is the format & content is proposed. A single row will be provided for each cabinet, with a separate file for each Distributor.

Field No.	Name	Details Required	Type	Length	Example – Cabinet entry
1	Road Reference	e.g. Ordnance Survey Number	Text	8	*blank*
2	Town, Parish, District		Text	30	Toddington
3	Road Name		Text	30	Leighton Road
4	Location		Text	20	Junction with Alma Farm Road
5	Unit Type	Identifies the record as a lamp or a sign, etc. B = bollard; F = school crossing flashers; L = street light; M = miscellaneous; P = pillar; R = Refuge Beacon; S = sign light; T = traffic signal equip; Z = Belisha Beacon (Zebra)	Text	1	M
6	Unit Identity	Identity shown on unit (if any)	Text	12	NAAKBN [Openreach maintain a unique ID for each cabinet known as DSLAM Id]
7	CMS Unit Reference	Unique alphanumeric identifier of the CMS Unit (if applicable)	Text	12	*blank*
8	Charge Code	Appropriate BSCP520 code	Numeric	13	813 0xxx 000 100 [single entry per cabinet – xxx populated with agreed values]
9	No. of Items	Number of items of this Charge Code at this location	Numeric	3	1
10	Switch Regime	Appropriate BSCP520 code	~~Numeric~~ Text	3	001 [indicates continuous load]
11	No. of Controls	Number of PECs or time switches on the item	Numeric	1	0
12	Control Charge Code	Appropriate BSCP520 code for the control device	Numeric	13	*blank*
13	Ordnance Survey Grid ref 'East' or Latitude	This can be either in Latitude or Eastings	Text	11	500489
14	Ordnance Survey Grid ref 'North' or Longitude	This can be either in Longitude or Northings	Text	11	228577
15	Exit Point (Optional)	Y if Yes, N if No, U if Unknown	Text	1	U

[12] www.elexon.co.uk/wp-content/uploads/2012/11/operational_information_document_v12.0.pdf (pages 35-36)

In addition to the data processing and storage defined above, Openreach will implement a robust set of detective controls that will be run periodically to ensure that the data quality meets the required standard, this will include the following:

- Comprehensive cross-referencing against other Openreach / BT Group inventory systems
- Random sampling of data and manual verification
- Statistical analysis against previous reports
- Internal and External audit as agreed.

This set of controls will provide confidence that the data provided is accurate, complete and based on assumptions that continue to be valid and justified.