

Carriage options for a TV Service in Wales

The Welsh Assembly Government has established an advisory group to develop a response to phase 2 of Ofcom's review of public service broadcasting and to consider what options there may be in the light of ITV's reduced commitment to original English language content for Wales.

This note is intended to inform the advisory group as to the realistic options for carriage of any new public service content offered to viewers in Wales, using the digital TV platforms.

1. Analogue TV Services

Analogue terrestrial TV services in Wales will be switched off during the period August 2009 - March 2010, based on main transmitter groups as follows:

West Wales/parts of Mid Wales	Kilvey Hill/Preseli/Carmel	August/September 2009
North Wales	Llanddona/Moel y Parc (+ Long Mountain relay)	October/December 2009
Mid Wales	Blaen Plwyf	February/March 2010
South East Wales	Wenvoe	February / March 2010.

Switchover affects terrestrial television coverage only. It has no direct effect on viewers already receiving TV services via satellite or cable.

Analogue Radio is not affected. (However, all digital TV platforms carry a range of radio services, providing improved coverage in some rural areas.)

2. Digital TV Platforms

In November 2008, viewers in Wales can receive digital TV by one or more of:

- Digital Terrestrial (Freeview) c.40 PSB and commercial services from main transmitters only (until analogue switchover)
c.16PSB services (no commercial services) from relay transmitters after Switchover
- Satellite 'freesat from Sky' PSB + commercial services - no monthly charge
- Satellite 'Freesat' (BBC/ITV) PSB + commercial services, including some HD services with no monthly charge
- Subscription satellite (Sky) PSB + a very wide choice of free and pay services
- Cable (Virgin Media) the widest choice of services as part of a 'triple play' of TV/broadband/telephony. Limited to urban areas.
- IPTV (Internet Protocol) not yet a mass market option because of limited bandwidth availability in most of Wales.
However, offers effective delivery of 'video on demand' as a supplement to Freeview (e.g. BT Vision) and satellite offers.

3. Take-up of Digital TV in Wales

Digital TV has been available in Wales on digital satellite and terrestrial platforms since 1998. After 10 years, it is present in most Welsh homes and is not 'new' technology.

People in Wales are more likely than the UK average to have converted to digital. By August 2008, 90% of Welsh homes had digital TV on their main set, and 60% of householders had converted all sets in the home.

50% of main sets in Wales receive a satellite TV service, 32% Freeview, and 7% cable.

There are significant regional differences within Wales. In North Wales, satellite has 59% penetration, with Freeview at 30%, and no cable. In West Wales satellite is at 39%, with Freeview at 38% and cable 14%. (Source: Ofcom/Digital UK tracker)

"All Wales" Freeview take-up is lower because of inadequate digital terrestrial coverage in many areas. West Wales Freeview take-up is higher (matching satellite) because 75% of homes in West Wales take their terrestrial signal from a main transmitter. At digital switchover Freeview will be carried by the relays as well as the main transmitters.

In order to access the main set in all homes in Wales it is necessary to secure carriage on (1) Freeview, (2) Sky Satellite, (3) Freesat, (4) Virgin Cable.

4. Carriage arrangements for PSB and Commercial Services

Not all digital services are treated the same - there is a hierarchy, as follows:

- Core PSB Services - BBC1/2, ITV1, S4C, C4, Five, Teletext only
These Services have a guarantee of carriage on all platforms ('must carry'), and preferential treatment in relation to their EPG slots/channel numbers. They have 'universal coverage' (= 98.4% of homes, using terrestrial transmissions)
- BBC Digital Services - BBC3/4/News 24/CBBC/CBeebies/BBC Parliament
These do not enjoy a 'must carry' guarantee, and EPG slots are negotiated with platform operators.
In practice these services will enjoy 'universal coverage' on Freeview and satellite capacity directly controlled by the BBC.
- Other Digital Services provided by PSB Broadcasters -
This category includes S4C2, ITV2/3/4, E4/More 4/Film4, Fiver/Five US, as well as some extra Teletext services (Teletext Holidays/ etc).
Some of these services can be accommodated within the limited Freeview capacity allocated to the 'parent' broadcaster. Otherwise, carriage is subject to commercial negotiation with platform operators.
- Commercial Services - all other services, of whatever genre.
Carriage is subject to commercial negotiation with platform operators.

Carriage on the satellite and cable platforms is relatively easy to obtain, subject to commercial negotiation. Freeview is a different matter, and is discussed below.

Outside the Core PSB and BBC Digital groups, the fact that a new service is obviously 'public service' in nature, and supported by public funds, does not mean that it will be given preferential treatment in relation to carriage arrangements. Examples are:

- BBC Alba, the new Gaelic language channel in Scotland, is available on satellite (and online via BBC iPlayer) but not on Freeview
- Teachers TV, funded by the DES, is available on satellite but has failed to secure more than a 2 hours slot on Freeview, and will not have 'universal coverage'.

5. Freeview Coverage - PSB and Commercial Multiplexes

5.1 Freeview - Overview

The 'Freeview' platform comprises 6 'multiplexes' ('muxes'), each capable of carrying a number of TV, radio and data services.

3 have been classified as 'PSB' multiplexes, with 'gifted' capacity for PSB broadcasters to carry their core services and some other services provided by them. 2 are controlled by the BBC (one of which is also licensed by Ofcom) and the other jointly by ITV and Channel 4, sharing the capacity 50/50.

The remaining 3 multiplexes are classified as 'commercial' capacity, which the operators can deal with as they wish subject to Ofcom regulation. One is controlled by SDN (now owned by ITV) and 2 by Arqiva.

Originally, Multiplex A operated by SDN was classified as a PSB multiplex as it carries Five throughout the UK and S4C Digidol in Wales. Mux A will lose its PSB status at Switchover, allowing the BBC's Mux B to take the third 'PSB' slot, and requiring the move of the Five and S4C Digidol services to a PSB multiplex.

There is a significant distinction between 'PSB' and 'commercial' multiplexes in relation to coverage and costs. Since launch in 1998, 'Freeview' has been carried only on the 50 'main' transmitters in the UK and the 30 biggest relays, which (operating at low power) offer c.75% UK coverage for 6 multiplexes carrying c.40 services.

At Switchover the 3 PSB multiplexes will be carried on all UK relays (c.1000 sites) as well as the main transmitters, giving total coverage of c.98.5% of UK homes. This is equivalent to existing UK analogue terrestrial coverage.

Ofcom's frequency plans assumed that the 3 commercial multiplexes would improve their coverage by using c.200 sites. It transpired that the higher transmitter powers available at Switchover should increase the existing 80 sites coverage from 75% to c.90%, and it is not cost-effective for the commercial multiplexes to occupy more sites.

5.2 Freeview Coverage in Wales

Within overall UK coverage there are significant regional differences. Wales has 7 main transmitter sites and c.200 relays (20% of the UK total – because of the mountainous terrain). Existing low power Freeview from main sites provides 6-Mux coverage to c.57% of Welsh homes. Higher powers at Switchover will increase this to c.73%.

'Analogue-equivalent' coverage will be available only to services carried on one of the 3 PSB multiplexes. There is currently no published estimate of future Freeview coverage for BBC Wales, ITV Wales, and S4C. Ofcom's estimate of PSB coverage in Wales is 97.8% (slightly lower than the UK average of 98.4%) but "taking account of reception also available from neighbouring transmitters in England". It follows that Freeview coverage for the 'Wales' services alone will be a few percentage points lower. However, it should match existing analogue coverage for the same services.

Digital Switchover will not create 'universal coverage'. Homes without "line of sight" to a transmitter will not be able to receive analogue or digital terrestrial services and will still need to rely on satellite options.

5.3 Lower Freeview Coverage for Commercial Services

The significant difference in 'PSB' and 'commercial' terrestrial coverage in Wales is a key issue for anyone seeking to use Freeview to offer a service to all TV homes in Wales. '6 Mux / 3 Mux' coverage figures are not yet available for Wales transmitters. In the meantime, a good indication of trend can be seen by analysing 'preferred analogue' coverage - there is a high probability that most people will continue to view the same transmitters/relays, using the same aerials.

In the analogue domain, the services carried on the main transmitters and their dependent relays are exactly the same. However, after Switchover, main transmitters will offer c.40 digital services, and relays will offer c.16 digital services (still a significant improvement over the original 4 analogue services!):

Area	'Preferred Analogue' viewing	
	Viewing Main Sites	Viewing Relays
West/Mid Wales	75%	25%
North Wales	60%	40%
South Wales	62%	38%
Total Wales	65%	35%

Total 'commercial' Freeview coverage in Wales after Switchover is estimated at 73% (see above) but this figure includes incoming overlap signals from transmitters in England. The 'preferred analogue' data suggests that a service carried on a Freeview commercial multiplex in Wales (only) would reach just two-thirds of homes in Wales. Satellite would improve coverage significantly, as would cable within the urban areas.

S4C2 is the only current example of a service targetted at homes in Wales carried on a Freeview commercial multiplex. S4C2 will not have the same terrestrial coverage as the main 'Wales' services, but it is also available on satellite and cable.

6. Freeview Services - Current and Future

6.1 Current Freeview Services

The Appendix sets out all of the services carried on Freeview in Wales, arranged by multiplex. This is included to illustrate some of the following points:

- Freeview multiplexes use two different transmission modes. At 16QAM, the available capacity is 18mb/s allowing carriage of c.6 videostreams plus some radio and data services. At 64QAM the capacity increases to 24 mb/s creating space for at least 8 videostreams plus some radio and data. 16QAM signals are marginally more resilient than 64QAM, but this will be addressed at Switchover when all multiplexes will move to 64QAM at much higher power. This will create an extra 2 videostreams on each of 3 multiplexes. (These will be used for HD - see below)
- The way in which capacity is used varies enormously. Different types of services need different levels of capacity and affect the overall 'mix' in different ways. Video is subject to statistical multiplexing and can be 'compressed'. This is not currently feasible for audio and data. The principal reason why capacity on BBC Mux1 seems to be under-used (4 videostreams) is that this multiplex carries the BBCi service, which has a heavy data requirement.
- Multiplex Operators vary in their approach. Some have taken a more prudent approach to the use of capacity. Others have worked hard to squeeze as much as possible into the available capacity.
- Some videostreams have been split by day-part in order to make capacity available to a wider range of services, and reduce cost to individual broadcasters. S4C2 is an example - the multiplex capacity used to carry this service is used by other services for parts of the day. This is an important point - the fact that a digital service is 'off air' does not mean that its capacity is available for use.
- Muxes B/C/D are not 'regionalised' - they carry the same services across the UK. Mux B may have to be re-engineered to enable 'nations' opt-outs for HD. Otherwise the only multiplexes able to carry a separate service in Wales are Mux1 (BBC), Mux2 (ITV/C4) and Mux A (SDN).
- In most cases, services are multiplexed at source and distributed to main transmitters and relays through a central network. Different content cannot easily be injected at individual sites or groups of sites because network capacity would have to be set aside from the stats-mux 'pool'. This reduces efficiency and the number of services that can be carried.

6.2 Proposed Introduction of HD Services on Freeview

Ofcom and the public service broadcasters are pursuing a strategy to introduce a limited number of High Definition (HD) services to the Freeview platform. This involves clearing Mux B of its existing services and substituting 3 (eventually 4) HD services to be broadcast using the newer MHEG4 transmission format. This format requires a

different digital box - the Freeview HD services will not work on existing Freeview boxes and iDTVs running MHEG2 format. (MHEG4 boxes will be backwards-compatible)

It is claimed that Freeview HD will launch from the end of 2009 but there are no receivers available for sale as yet and some of the relevant technical standards have yet to be agreed, so this may take some time. Few people believe that the launch date will be achieved, certainly not as a full consumer launch.

In order to deliver Freeview HD the PSB multiplexes will need radical re-planning:

- BBC Mux1 will use the 64QAM mode in order to accommodate 2 extra videostreams
- 2 services from ITV/C4 Mux2 will have to move to a commercial multiplex or be lost from the Freeview platform - we do not know which services
- Available capacity for non-HD PSB services will be limited to just 2 multiplexes (including accommodating S4C Digidol and Five - see below).

At this stage we cannot identify the future line-ups on the PSB multiplexes nor how the shift of PSB services will affect the commercial multiplexes.

What is certain is that Freeview capacity will continue to be scarce and valuable.

6.3 S4C and Five

As noted above, because Mux A will cease to be a PSB multiplex as Switchover rolls out, S4C Digidol and Five will be required to move in order to secure PSB coverage.

They will need 2 slots within the PSB capacity. In the case of S4C Digidol there may be capacity issues as this service carries higher than usual technical 'overheads' because of additional subtitling and audio feeds.

Ofcom's plan (and the Order varying capacity allocations) assumes that S4C Digidol and Five will move to Mux2 which already has a regional structure because of ITV/C4. However, Five has recently announced an agreement with the BBC to move to Mux B in the short term, and S4C is believed to be in negotiations with the BBC and Mux2. This adds further uncertainty to the multiplex line-ups in the medium term.

Only the 'PSB core' S4C Digidol and Five services will be moved to a PSB mux. The 'extra' services - S4C2, Fiver and Five US - will remain on a commercial multiplex.

6.4 Changes to the Freeview 'commercial' line-up

Analogue TV is a very stable environment with no new channels for more than 10 years. Digital TV is dynamic, especially in the case of commercial services. The following changes are anticipated currently:

- Sit-Up will be thrown off Mux A in January in favour of Discovery 'Quest' following a 're-bid' auction
- CNN (European version) replaces Nuts TV early next year (both owned by Turner) 9pm - 1am slot

- Mojo (radio) will close down on 30th November on all platforms. This may open up a slot for a new radio station to launch on Freeview
- One of Top Up TV's linear pay channels - Eurosport - has been temporarily removed from the Freeview line-up but is expected to be re-instated later in November in a different time-slot with longer hours in the daytime.

These are all short-term events, but they illustrate the need for aspiring Freeview broadcasters to keep an eye on the market in case capacity becomes available.

7. Is there a realistic prospect of obtaining a Freeview slot?

7.1 Commercial Multiplex

The short answer is yes, on a commercial multiplex, but it would take a long time, would be very expensive, and would need a UK broadcast partner to allow the platform operator to sell a UK videostream.

There is intense competition for Freeview capacity. The current cost of a UK-wide 24 hour slot is c.£10m per annum on a commercial multiplex, based on a 3 - 5 year deal (after which a re-bid would be needed, and the capacity might be lost).

Apportioning by population, 5% of the cost should relate to Wales, but based on transmitters (which seems relevant) this gives 7.5% (6/80) for a commercial mux, but 20% (200/1000) on a PSB Mux.

That is not the end of the story. To offer a separate multiplex service in Wales the platform operator would need additional compression and multiplexing equipment - in effect, an additional head-end. This already exists on Mux A, which would be the most obvious place for such a service. However, Arquiva (which owns Mux A equipment) controls Muxes C and D, so there may be other options.

7.2 Public Service Multiplex

This seems highly unlikely without political and regulatory intervention.

The hours allocated to S4C2 on Freeview are used for live broadcast of the Welsh Assembly, but S4C would like to use these hours for the children's channel 'Cyw'. In theory there should be available space on S4C2 in the evenings, but existing carriage agreements with Multiplex A would make this difficult to achieve. That would not necessarily be the case if the service were moved to a different multiplex

If the competing aspirations for S4C2 were combined with additional English language provision, it might be feasible to fill most of a videostream, but this might prove to be 'mission impossible', given the various agendas of broadcasters and regulators, and the intense competition for Freeview slots. Certainly this could not be achieved without displacing another PSB channel, but this would elevate 'Cyw' and Welsh Assembly coverage to PSB coverage status.

Additional satellite capacity would be needed for the extra hours, and channel numbers would need to be re-negotiated - Freeview and Sky classify S4C2 as a news channel.

7.3 Freeview alone is insufficient

Because of the fragmented nature of digital platforms in Wales any Freeview solution would need to be part of an integrated strategy including both free satellite platforms as well as cable.

This is particularly true if carriage is on a Freeview commercial multiplex but even Freeview PSB will not be seen on the main set in around half of Welsh homes where satellite is the platform of choice.

8. Other matters

8.1 EPG Slots

Every digital platform carries an Electronic Programme Guide (EPG) which helps the viewer to navigate across dozens or hundreds of services.

A low or memorable EPG number is a valuable asset - but all of the best numbers have been allocated long ago.

The next available Freeview channel number for a general service would be 48.

Satellite and Cable platforms tend to view channel numbers from a UK perspective. Regional variations of ITV are all entitled to 103, and S4C is protected in Wales on Freeview at 4, and Sky 104, but 194 on Virgin Cable. A new service would not have protection, and would be allocated a 'high' number making it more difficult for some viewers to find it.

8.2 Do viewers receive new channels automatically?

Many (most) Freeview boxes and iDTVs do not offer an 'auto-rescan' facility. Any new services coming onto the platform may not appear until the user goes into the 'menu' function and re-scans the box. This is not a major issue but demonstrates the need for publicity when a new service launches - otherwise many viewers may be unaware of it.

Satellite and Cable platforms are more closely controlled. New channels appear on the EPG automatically.

8.3 Contribution

The broadcaster must arrange a resilient high capacity link to deliver service content to the multiplex centre (or 'head-end') for each platform on which the service is carried. Where there are several platforms, the costs can mount up, although contractors such as Arqiva may link on to more than one centre.

A common ploy is to try to save money by using the Sky satellite signal to deliver a service to Freeview and cable head-ends. This is not acceptable for technical reasons.

8.4 Satellite

Satellite carriage can be contracted from Sky, or a separate deal made with SES in Luxembourg for the necessary bandwidth. In either case, an essential requirement is an agreement with Sky (and now with Freesat) for an EPG slot and channel number, without which the service will be invisible to the viewer.

8.5 Cable

Cable carriage requires a commercial arrangement with Virgin Media, and delivery of a service signal to their head-end in Langley, nr Slough.

8.6 Broadband/Internet

An integrated delivery solution must include access to service content through the internet. This would serve some households in Wales as well as a large ex-pat community.

In Wales, broadband/IPTV is not yet a mainstream solution. Bandwidth in much of Wales is limited and take-up lags behind the rest of the UK (Source: Ofcom) although it is acknowledged that the Assembly Government is seeking to address these issues.

8.7 Local Television

In October, Ofcom launched a consultation proposing the allocation of capacity for a low power local digital multiplex from Wenvoe (to serve Cardiff) and Winter Hill (to cover Manchester). If successful, the scheme may be extended to other areas.

I have referred to this initiative because a Cardiff local TV station could be a useful element of an integrated plan for delivering content to homes. It is not yet clear whether the proposal might include any of the Wenvoe relays as well as the main transmitter. This would have a significant impact on local coverage.

9. How about the viewers?

9.1 Brand loyalty

Multi-channel growth has undermined the traditional broadcasters' audience share, but the key UK terrestrial TV brands still retain the loyalty of the majority of the audience.

Ofcom's Communications Market Report (May 2008) tells us that the five main PSB channels (including C4 as well as S4C) still maintained a collective viewing share of 62% in 2007. BBC1 was the most watched channel (23% share) followed by ITV (20%).

These two major channels between them offer the most effective way of communicating with the audience in Wales.

9.2 Opting out of Network

There is some recent evidence of viewer resistance to the displacement of popular network programmes in favour of 'regional' programmes.

The experience of the Ferryside switchover trial (2005) was that a significant and vocal minority of participating households would not accept the loss of BBC2 Wales analogue if it were replaced by the 2W digital service. Eventually the BBC arranged to provide the 'normal' BBC2 Wales service as well, in order for the switchover trial to proceed. [Ferryside Trial Report]

However, the daily regional opt-outs from the BBC and ITV networks are accepted universally because they occur across the whole network, are established and have popular support.

10. Conclusions

- (a) The best 'home' for English language content for Wales is a combination of BBC Wales and ITV Wales, both of which offer a loyal mass audience and PSB coverage. Together they achieve a 43% share of audience. [Ofcom/ 2007 data]
- (b) Any alternative provision to ITV Wales would be very expensive. The cost and benefits must be balanced against seeking a financial accommodation with ITV.
- (c) However, ITV seems to be an unwilling suitor and would inevitably seek to limit the hours of local output and impose significant scheduling constraints. None of this would apply in the case of a separate service.
- (d) Securing Freeview carriage on a PSB multiplex would be exceptionally difficult and would require political and regulatory intervention.
- (e) Freeview carriage on a Commercial multiplex should not be impossible, but it would take time and would be very expensive. It might be difficult to persuade a commercial multiplex operator to create a separate regional service, but this would be a matter for negotiation.
- (f) In all cases, an integrated 'multi-platform' approach to coverage is essential, taking in Freeview, satellite and cable, plus broadband provision.

EBH / 14.11.08

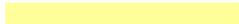
DTT (Freeview) Services in Wales - November 2008

PSB Multiplexes

Appendix - 1

BBC Mux 1 (16QAM, 18mb/s)

V/S	EPG	TELEVISION SERVICES	Tx Hrs
1	1	BBC One	24 hours
2	2	BBC Two	24 hours
3	70	CBBC Channel	07:00 - 19:00
	7	BBC Three	19:00 - 04:00
4	80	BBC News Channel	24 hours

	PSB Services
	Commercial Services from PSB Broadcasters
	Commercial Services from Third Parties
	Public/Charity funded

RADIO SERVICES

719	BBC Radio Wales	24 hours
720	BBC Radio Cymru	24 hours

DATA SERVICES

105	BBCi	24 hours
-----	------	----------

BBC Mux B (16QAM, 18mb/s)

V/S	EPG	TELEVISION SERVICES	Tx Hrs
1	71	CBeebies	06:00 - 19:00
1	9	BBC Four	19:00 - 04:00
2	81	BBC Parliament	24 hours
3	87	Community Channel	06:00 - 09:00
3	301	BBCi Interactive Video	Varies
4	302	BBCi Interactive Video	Varies
5	303	BBCi Interactive Video	24 hours
6	305	BBCi Interactive Video	Varies

RADIO SERVICES

700	BBC Radio 1	24 hours
701	BBC 1Xtra	24 hours
702	BBC Radio 2	24 hours
703	BBC Radio 3	24 hours
704	BBC Radio 4	24 hours
705	BBC Radio 5 Live	24 hours
706	BBC R5 Live Spt Extra	Varies
707	BBC 6 Music	24 hours
708	BBC 7	24 hours
709	BBC Asian Network	24 hours

ITV/C4 Mux2 (64QAM, 24mb/s)

V/S	EPG	TELEVISION SERVICES	Tx Hrs
1	3	GMTV	06:00 - 09:25
1	3	ITV1	09:25 - 06:00
2	6	ITV2	09:25 - 06:00
3	10	ITV3	24 hours
4	28	ITV4	09:00 - 04:00
5	8	Channel 4	24 hours
6	13	Channel 4 +1	24 hours
7	14	More4	10:00 - 02:00
8	29	E4	24 hours
[9]	34	Setanta Sports	Occasional

RADIO SERVICES

728	Heart	24 hours
-----	-------	----------

DATA SERVICES

100	Teletext	24 hours
104	Teletext On 4	24 hours

DTT (Freeview) Services in Wales - November 2008

Commercial Multiplexes

Appendix - 2

ITV Mux A (64QAM, 24mb/s)

V/S	EPG	TELEVISION SERVICES	Tx Hrs
1	4	S4C Digidol	12:00 - 00:00
2	86	S4C2	09:00 - 18:00 Tue-Thur
2	16	QVC	24 Hrs ex 09:00-18:00 Tue-Thur
3	5	Five	24 hours
4	23	Screenshop	05:00 - 08:00
4	23	Bid TV	08:00 - 19:00
4	44	Gems.tv	19:00 - 21:00
4	42	Nuts TV	21:00 - 01:00
5	24	price-drop tv	08:00 - 01:00
5	24	Screenshop	01:00 - 08:00
6	36	Fiver	06:00 - 23:00
6	97	Television X	23:00 - 05:00
	33	British Eurosport	07:30 - 10:00
7	35	Five US	12:00 - 01:00
8	26	UKTV Style	14:00 - 16:00
8	88	Teachers' TV	16:00 - 18:00
8	17	GOLD	18:00 - 23.30
	38	Top Up TV Anytime 1	Varies
	39	Top Up TV Anytime 2	Varies
	40	Top Up TV Anytime 3	Varies
	46	SmileTV 2	TBC
	RADIO SERVICES		
712		Smash Hits!	24 hours
721		Mojo Radio	24 hours
	DATA SERVICES		
101		Teletext Holidays	24 hours
103		Teletext Casino	24 hours

Arqiva Mux C (16QAM, 18mb/s)

VS	EPG	TELEVISION SERVICES	Tx Hrs
1	11	Sky 3	24 hours
2	19	Dave	07:00 - 03:00
	37	Smile TV	03:00 - 07:00
3	30	E4 +1	24 hours
4	82	Sky News	24 hours
5	83	Sky Sports News	24 hours
	RADIO SERVICES		
723		TalkSport	24 hours
724		Clyde 1	24 hours
725		Premier Christian R	24 hours
727		Absolute Radio	24 hours
	DATA SERVICES		
108		Sky Text	24 hours
304		TVTV Digital	24 hours

Arqiva Mux D (16QAM, 18mb/s)

VS	EPG	TELEVISION SERVICES	Tx Hrs
1	12	UKTV History	07:00 - 18:00
	20	Virgin 1	18:00 - 06:00
2	18	4Music	24 hours
3	21	The Music Factory	24 hours
4	22	Ideal World	24 hours
5	31	ITV2 +1	24 hours
6	45	National Lottery Xtra	08:45 - 09:45
	43	Gems.tv	09:45 - 12:45
	32	Film4	13:00 - 03:00
	RADIO SERVICES		
710		BBC World Service	24 hours
711		The Hits Radio	24 hours
713		Kiss 100	24 hours
714		Heat Radio	24 hours
715		Magic Radio	24 hours
716		Q Radio	24 hours
718		102.2 Smooth FM	24 hours
722		Kerrang!	24 hours
	DATA SERVICES		
300		4TV Interactive	Tech D/load

	PSB Services
	Commercial Services from PSB Broadcasters
	Commercial Services from Third Parties
	Public/Charity funded