

Terrestrial TV and the Digital Transition



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Types of Terrestrial TV

- NTSC – Analog standard
 - First adopted in 1941. Revised in 1953 to add colour while still being compatible with black & white TV sets.
 - Still in used today (57 years later)
- ATSC – Digital standard
 - Adopted by FCC in 1996

ATSC Features

- Allows for multiple resolutions (SD & HD)
- Data such as time and callsign are broadcast
- Several hours to several days of guide data including detailed program descriptions
- Broadcasters can define sub-channels
- Uses the same bandwidth and spectrum as analog channels
- Either you get the station perfectly or you don't. No ghosting, herringbone, static.
- Has error correction that can sometime over come interfering signals.

The Digital Transition (USA)

- Occurred on June 12, 2009
- Delayed from Feb 17, 2009 only weeks before it was supposed to occur.
- All full power analog stations were required to change to digital with the same coverage area
- Low power analog stations (i.e. community stations) are exempt for several years
- Federal government provided \$40 coupons to households to buy a digital converter box. Most were priced at \$40.

The Digital Transition (Canada)

- Proposed to occur on Aug 31, 2011
- Currently only 29 stations are digital in ALL of Canada. Mostly in metro areas
- In July 2009, the CRTC ruled that only metro areas need to transition to digital.
 - Smaller markets will stop broadcasting and will be available only via cable or satellite ☹
 - Metro areas in Ontario: **GTA, London, Windsor, Kitchener and Ottawa.**

Spectrum Changes

- 1980's – Present (Canada only):
 - VHF (Channel 2 – 13)
 - UHF (Channel 14 – 69)
- After the conversion (Currently in USA):
 - VHF (unchanged)
 - UHF (Channel 14 – 51)
 - In USA: Some spectrum set aside for public safety, the rest was auctioned off. (52 of the available 62 MHz was sold for a total of \$19.592 Billion USD)

ATSC Confusion (Sub-Channels)

- Broadcasters can provide sub-channels.
 - ~19MBps of digital bandwidth is available in a single 6MHz ATSC carrier. Stations can provide multiple channels from the same transmitter
 - Ex. WGRZ in Buffalo, NY provides:
 - 2.1 WGRZ-HD (NBC High Definition)
 - 2.2 WGRZ-US (Universal Sports)
 - 2.3 WGRZ-RT (Retro TV Network)

ATSC Confusion (PSIP)

- Because viewers are used to the old analog channel numbers the ATSC standard allows the broadcaster to assign a virtual channel number that is different from the channel the station is actually broadcasting on.
 - “66.1 WFXP” in Erie is on Channel 22
 - “7.1 WXYZ” in Detroit is on Channel 41
 - “2.1 WJBK” in Detroit is on Channel 7
 - (OLD) “10.1 WHEC” in Rochester used to be on Channel 58.

What Channels are Currently Available in the London Area?

- Most of the Canadian stations carry all of the popular US shows (Global and CTV)
- 7 Analog channels in London
- 1 Digital channel in London
- 4 Analog channels just outside of the city

Current London Area Channels

Channel	Network	Callsign	Location
6	Global	CIII	Paris / Ayr
10	'A'	CFPL	London
13	CTV	CKCO	Baden / KW
14	CTS	CITS	Byron
18	TVO	CICO	Byron
19.1	Sun TV HD	CKXT	Byron
20	Omni.2	CJMT	Byron
31	City TV	CITY	Woodstock
40	CBC	CBLN	Byron
51	CHCH	CHCH	Alvinston
53	SRC (French)	CBLFT	Byron
69	Omni.1	CFMT	Byron

Receiving London Channels

- Most London channels should be received with a indoor UHF antenna or rabbit ears.
- CFPL (VHF) is so strong that any antenna should do. Attenuation might be needed.
- Global and CTV from the east will require a VHF antenna (small Yagi)
- Try moving indoor antenna up/down or left/right several feet as 'shadows' can occur.



ATSC Confusion (Rescanning)

- Most broadcasters are assigned a transitional channel that they can use at the same time as their analog channel. Usually this channel is close to their current or future frequency so that they can multiplex with existing antennas.
- Some broadcaster will remain on their transitional channel after the analog switch-off. Others will move their digital transmitter to their old analog frequency.

ATSC Confusion (Rescanning)

- Problem: On the day of the switch, people will need to 'rescan' for channels to restore some of the channels they previously had.
 - Ex. WICU (12.1) changed from transitional channel 52 to their old channel 12. Without a rescan the converter boxes are still expecting to find 12.1 on physical channel 52.

Future for the London Area (proposed/allocated channels)

As of 2008: [http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/DTV_PLAN_Dec08-e.pdf/\\$file/DTV_PLAN_Dec08-e.pdf](http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/DTV_PLAN_Dec08-e.pdf/$file/DTV_PLAN_Dec08-e.pdf)

Old Analog	Transitional Digital	Final Digital	Network	Location
6	30	6	Global	Paris / Ayr
10	57	10	'A'	London
13	7	13	CTV	Baden / KW
14	None	14	CTS	Byron
18	60	18	TVO	Byron
19.1	N/A	19	Sun TV HD	Byron
20	48	20	Omni.2	Byron
31	51	31	City TV	Woodstock
40	23	49	CBC	Byron
51	24	24	CHCH	Alvinston
53	3	7	SRC (French)	Byron
69	47	48	Omni.1	Byron

Myth (no VHF)

- Myth: All digital channels are on UHF.
- Answer: No
 - While most channels will be moving to UHF some remain on VHF
 - Erie (ch 12), Detroit (ch 7), Cleveland (ch 8)
 - A lot of the VHF low (2-6) channels are gone (only about 40 remain). Great DX opportunity to get other countries.
 - Some cities (possibly intentionally) have all of their channels very close in frequency
 - Detroit (7,14,21,39,41,43,44,45,48)
 - Buffalo (14,28,32,33,34,38,39,43,49)

Myth (HD antenna)

- Myth: You require a “HD Ready” Antenna.
- Answer: No
 - Any old antenna will do the job.
 - Some manufacturers have redesigned antennas for the new UHF range (14-51)
 - Most have just re-branded an old antenna as “HD” to increase sales.

Myth (Need a new TV)

- Myth: You'll need to buy a new TV to get digital channels.
- Answer: No
 - Cheaper converter boxes are available with video or S-video outputs to connect to old analog TVs.
 - TVs sold for the past several years, must have a digital tuner built in.

Myth (Cable & Satellite)

- Myth: You'll need a converter box for cable. Satellite or Cable is the only way to get TV after the switch over.
- Answer: No, partially.
 - A lot of cable & satellite companies took advantage of the confusion to get new customers.
 - Converter boxes are only good for terrestrial TV. Cable and satellite use different hardware.
 - Cable companies can still provide analog channels on their service.
 - CRTC decision for small markets may mean channels are only available via satellite / cable. Proposal suggests they should be offered for free.

Myth (Better Picture Quality on Cable & Satellite)

- Myth: The picture quality of digital channels is better on cable or satellite.
- Answer: No
 - The quality is just as good as cable or satellite.
 - Most of the time the quality on an antenna is better
 - Reason: Broadcasters will provide one HD channel with their 6 MHz of bandwidth. Cable or satellite will compress 3 HD channels in to the same bandwidth.

Myth (Subscription required)

- Myth: Subscription is required to get HD channels or a subscription will be required in the future.
- Answer: No
 - These are the same quality (or better) stations that are offered by the cable / satellite company. Less the specialty channels (ex. HBO)
 - The ATSC model does not have an encryption system.
 - Billions of dollars has been spent in converting the stations and the US government subsidized the purchase of converter boxes. Don't expect anything to change with the standard, after all the last one was around unchanged for 57 years!

Myth (Loss of channels)

- Myth: A digital channel doesn't have the same coverage area as an analog channel.
- Answer: It depends
 - False: FCC analyzed the coverage area to ensure that the stations should have an equivalent or better coverage area, maps are available on their website.
 - Possibly: Some people that had really snowy analog reception maybe no longer be able to lock on the digital channel.
 - Ex. WSEE in Erie, PA at my location.

Problems



- Long coax runs
- Poor quality coax (RG-59)
- Cheap 300Ω:75Ω baluns with excessive insertion loss
- Amplifiers (noise figure, overloading)
- Cheap small antennas that are over amplified. Appealing to customers, but too good to be true.

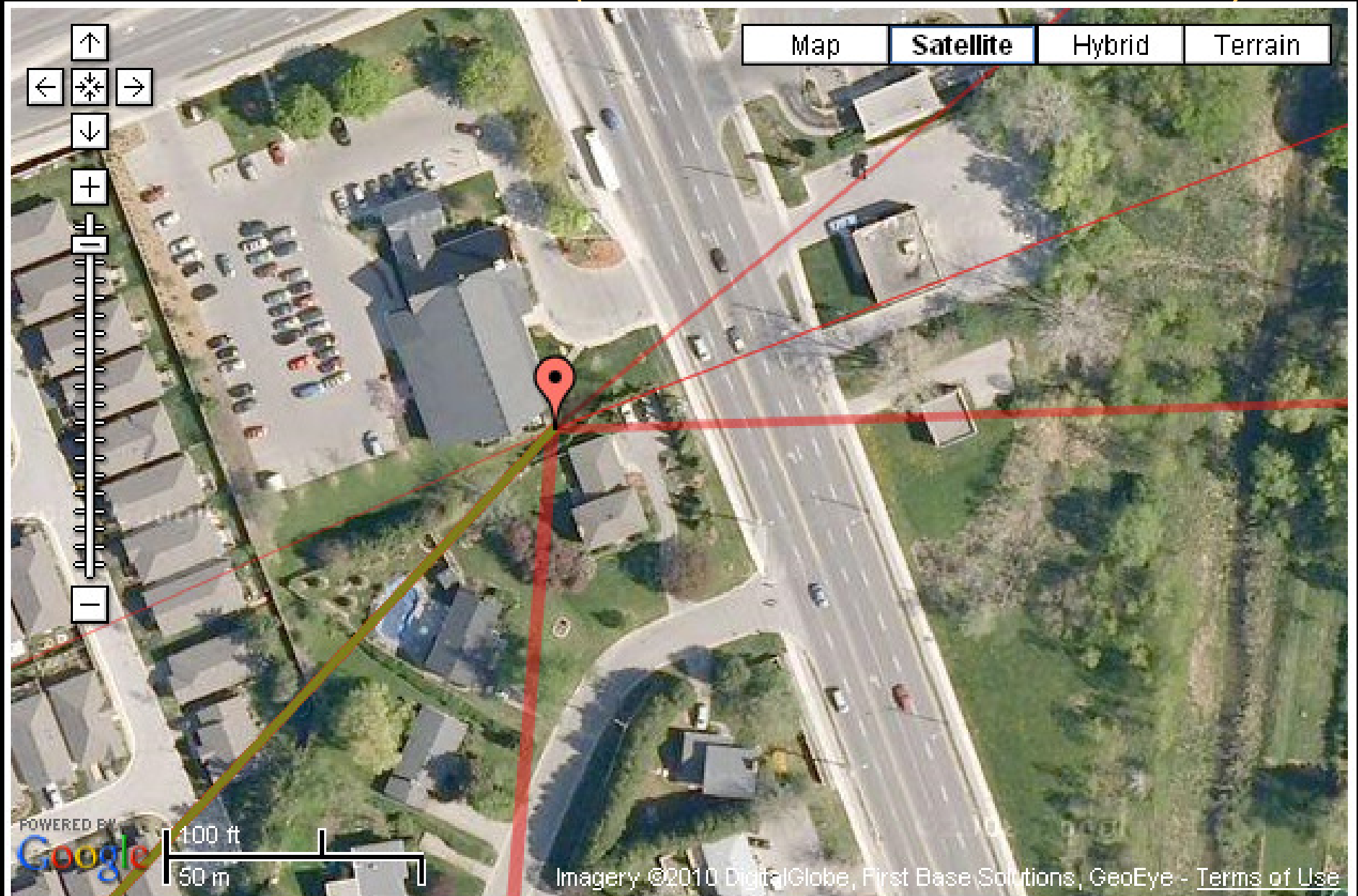
My QTH (VA3TJS's)



Digital Channels at VA3TJS

Channel	Physical Channel	Location	Strength
12.1 WICU-HD (NBC) 12.2 WBEP-SD (CW) 12.3 WSEE-SD (CBS)	12	Erie, PA	75%
19.1 CKXT-HD (Sun TV)	19	Byron, ON	100%
24.1 WJET-HD (ABC)	24	Erie, PA	85%
26.1 WNYB-SD 26.2 WNYB-HD (Religious)	26	Jamestown, NY	<50%
35.1 WSEE-HD (CBS) 35.2 WBEP-SD (CW)	16	Erie, PA	55%
54.1 WQLN-HD (PBS) 54.2 WQLN-S1 (Create) 54.3 WQLN-S2 (Kids)	50	Erie, PA	70%
66.1 WFXP-HD (Fox)	22	Erie, PA	95%

TV Fool (Antenna Direction)



43.033859,-81.254738 antenna height: ft (above ground level)

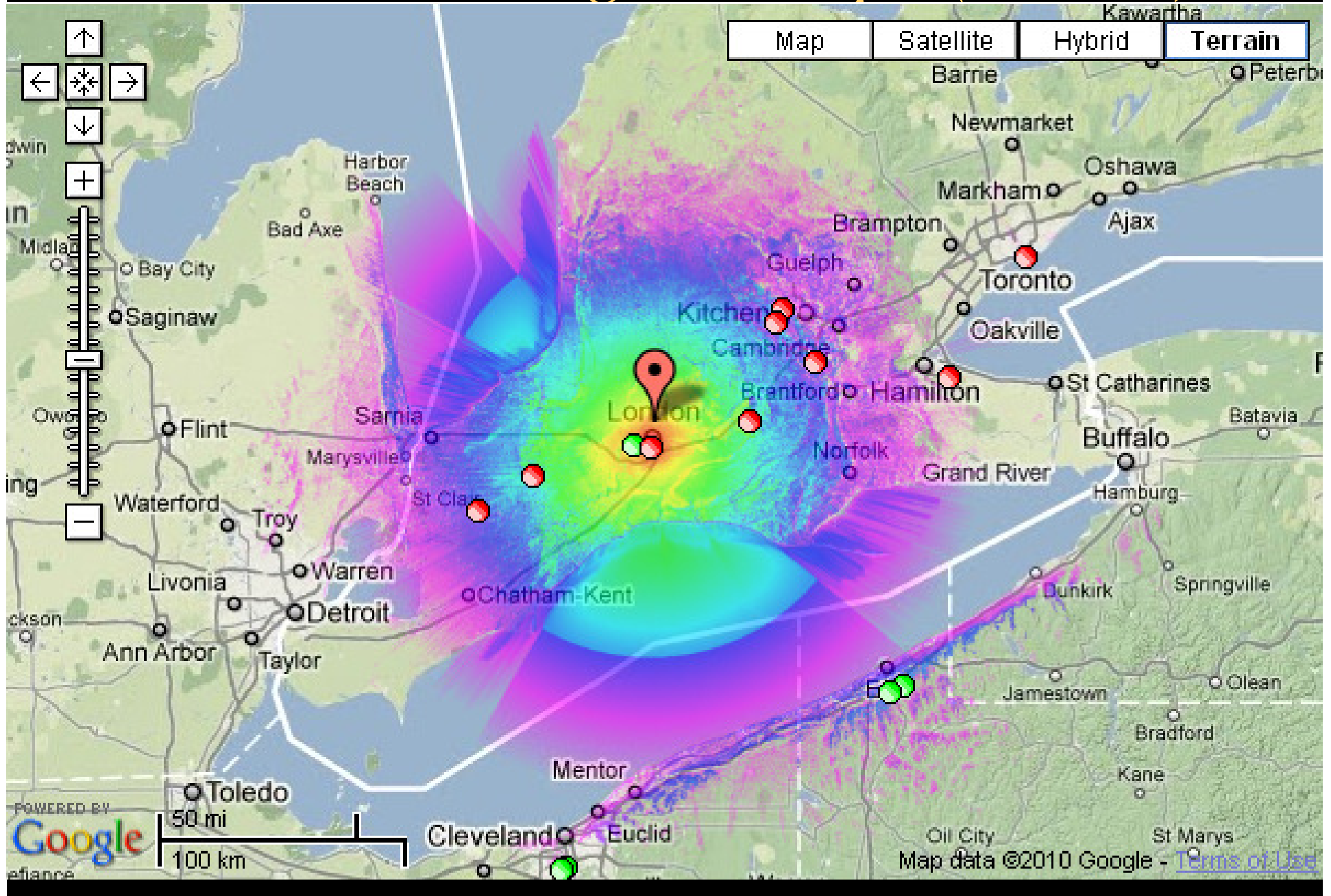
TVFool Channel Prediction

Predicted Channel Availability (Current)

Analog						Digital							
Callsign	Chan	Network	Dist (mi)	Path	NM (dB)	Callsign	Chan	Network	Dist (mi)	Path	NM (dB)		
<input type="radio"/>	CFPL-TV	10	A	5.8	LOS	66.9	<input type="radio"/>	CKXT-DT-2	19 (19.1)	Sun	7.4	LOS	51.3
<input type="radio"/>	CBLN-TV	40	CBC	7.4	LOS	61.1	<input type="radio"/>	WICU-TV	12 (12.1)	NBC	92.1	2Edge	-14.3
<input type="radio"/>	CFMT-TV-1	69	OMN	7.4	LOS	52.6	<input type="radio"/>	WEWS-TV	15 (5.1)	ABC	117.3	Tropo	-17.6
<input type="radio"/>	CICO-TV-18	18	TVO	7.4	LOS	47.2	<input type="radio"/>	WBNX-TV	30 (55.1)	CW	116.4	Tropo	-18.4
<input type="radio"/>	CBLFT-9	53	SRC	7.4	LOS	46.8	<input type="radio"/>	WQLN-DT	50 (54.1)	PBS	91.2	2Edge	-20.0
<input type="radio"/>	CJMT-TV-1	20	OMN	7.4	LOS	39.9							
<input type="radio"/>	CITY-TV-2	31	Ind	24.6	LOS	38.0							
<input type="radio"/>	CITS-TV-2	14	Ind	7.4	LOS	35.0							
<input type="radio"/>	CKCO-TV	13	CTV	40.5	2Edge	16.5							
<input type="radio"/>	CHCH-TV-2	51	Ind	33.3	1Edge	12.3							
<input type="radio"/>	CIII-TV	6	GTN	43.8	2Edge	12.0							
<input type="radio"/>	CICO-TV-28	28	TVO	43.8	2Edge	-4.5							
<input type="radio"/>	CBLFT-8	61	SRC	43.8	2Edge	-8.0							
<input type="radio"/>	CKCO-TV-3	42	CTV	49.7	2Edge	-11.4							
<input type="radio"/>	CHCH-TV	11	Ind	75.7	2Edge	-14.1							
<input type="radio"/>	CBLN-TV-1	56	CBC	43.8	2Edge	-15.2							
<input type="radio"/>	CBLT	5	CBC	103.3	2Edge	-19.3							

Background color	Estimated signal strength
Green	An indoor "set-top" antenna is probably sufficient to pick up these channels
Yellow	An attic-mounted antenna is probably needed to pick up channels at this level and above
Red	A roof-mounted antenna is probably needed to pick up channels at this level and above
Grey	These channels are very weak and will most likely require extreme measures to try and pick them up

TVFool Signal Maps (CFPL)



Recommended Websites

- <http://www.tvfool.com>
 - TV Signal prediction customized for your location and height using Google Maps. Experiment before installing.
- <http://www.digitalhome.ca/forum/forumdisplay.php?f=81>
 - Wide variety of topic. Antennas, amps, homebrew, etc
- <http://www.digitalhome.ca/forum/showthread.php?t=115171>
 - People in the London area talking about their reception
- http://www.hdtvprimer.com/ISSUES/erecting_antenna.html
 - Make sure to visit the “Comparing some commercially available antennas” before buying anything. KQ6QV makes actual measurement and shows how the manufacturers exaggerate the gain of their antennas.