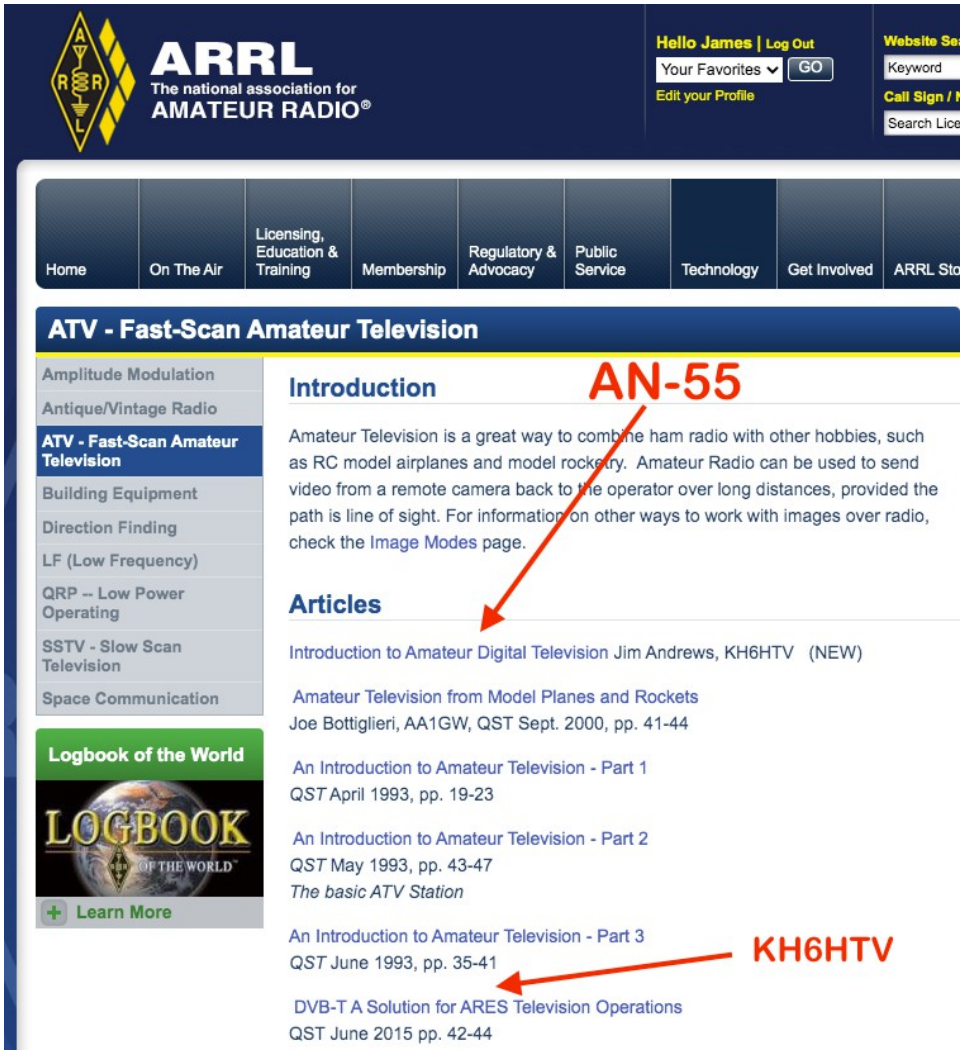
Boulder Amateur Television Club
TV Repeater's REPEATER

June, 2021
3ed edition, issue #80

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

Jim Andrews, KH6HTV, editor - kh6htv@arrl.net www.kh6htv.com

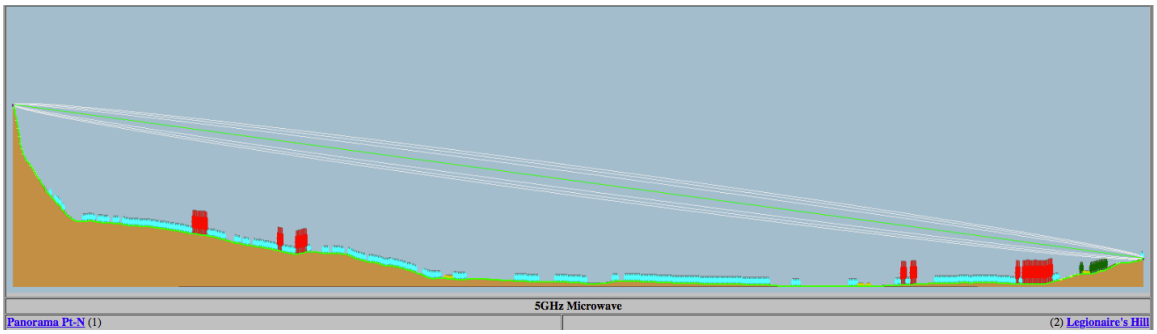


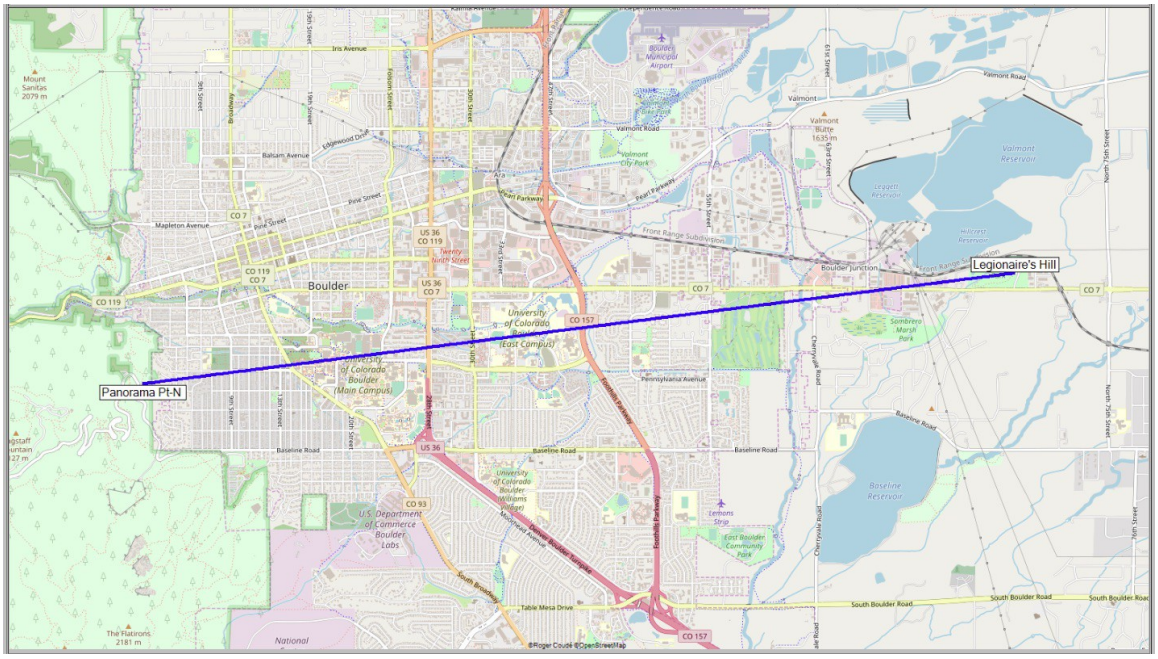
The ARRL web site is getting up to date for ATV. Check it out. Log onto www.arrl.org. Then in the Website Search box, enter the keyword, *ATV*. This is what will now come up. The top technical article is now the **"ATV Handbook - an Introduction to Amateur TV"**, by Jim Andrews, KH6HTV. It is his application note, AN-55a. Also listed is his QST article from June, 2015 on DVB-T and it's application to ARES.

1st Microwave Outing of 2021

Don, N0YE, organized our first BATVC microwave event of 2021 for Thursday, June 17th. This one was with Hi-Def, digital TV (DVB-T) on the 5 cm band. Participating along with Don were Bill, ABOMY, Chris, K0CJG, and Jim, KH6HTV. This was Chris's first taste of playing with ham microwaves. He used one of Don's home-brew transverters. Bill was anxious to try out his new home-brew transverter which he designed and built over the past winter.

Our previous 5.8GHz outing was last September and documented in our ATV newsletter issue #58. On that outing we were shooting for some long distance records. We thus went to several remote locations. Our 2020 distance record was 51km (≈ 32 miles). This time, because it was the first time for Chris and Bill wanted to test out a totally new rig, Don selected two excellent sites with only 8.9 km (5.5 miles) separation. Don and Chris set up on Legionaire's Hill on the east side of Boulder, off of Arapahoe Ave. Bill and Jim set up on Flagstaff mountain at Panorama Point on the west side of Boulder. The above photo is the view from KH6HTV's dish antenna on Flagstaff looking at Legionaire's Hill. The red arrow tip is on N0YE & K0CJG's location.





8.9 km RF Path for our 5.7 GHz, DVB-T signals

We operated on 5.678 GHz which is below the un-licensed Wi-Fi band. We were using DVB-T modulation with 6 MHz band-width. Most of us were using the L-Com model HG5822EG, BBQ grill dish antenna with 23dBi gain. It is seen in the above photo. We used horizontal polarization. We used the BCARES 146.76 MHz, 2m, FM voice repeater for our intercom coordination.

Don's & Chris's 5GHz Transverters were built by Don and the key component was a cross-over, transfer coax relay which allowed Don to use a single mixer and amplifier for both receive and transmit. For technical details on Don's rig, see past issue #56. Jim's Transverter has been discussed in several previous issues of this newsletter. See issues # 37, 56 & 57. We hope to have a report soon from Bill on the design and construction of his new 5G Transverter.

We were able to successfully exchange two way contacts across the 8.9km path. Don and Chris's signals were the weakest and occasionally suffered freeze framing. Don and Chris were both able to copy quite well Bill and Jim's stronger signals. Our DVB-T receivers all include DVR (i.e. Digital Video Recorder) capability. Both Chris and Jim

had memory cards in their receivers and were able to record portions of the received signals. A collection of photos from the recorded videos and still camera shots from the outing are included on the following pages.

I forgot to mention, we again had an un-invited guest. Dr. Murphy made his appearance. This time he attacked Chris's Canon camcorder. Chris and Don wasted a lot of time trying to de-bug the issue. The conclusion was the HDMI output failed on Chris's camcorder. The other issue we are constantly battling when out in the open -- too bright sunlight. Our cameras work ok in the bright sun, but we have one heck of a time seeing our video monitors. Even putting them deep inside a cardboard carton, it is still difficult. Also, I found the bright sun over-whelmed the IR input on my HV-120 receiver. It was extremely difficult to get it to respond to the remote control commands.

Don made absolute signal strength measurements of Bill and Jim's signals. He was using a Hi-Des HV-110 as his IF receiver, which has a very accurate S meter. For Bill, AB0MY, he reported from the On Screen Display (OSD) -66dBm and 15dB s/n. For Jim, KH6HTV, he reported -45dBm and 23dB s/n (i.e. perfect for QPSK). Don later reported that his transverter gain was 17dB and his antenna coax loss was -3.5dB. Thus the signal strength of Jim's signal at the antenna input to his transverter was -62dBm.

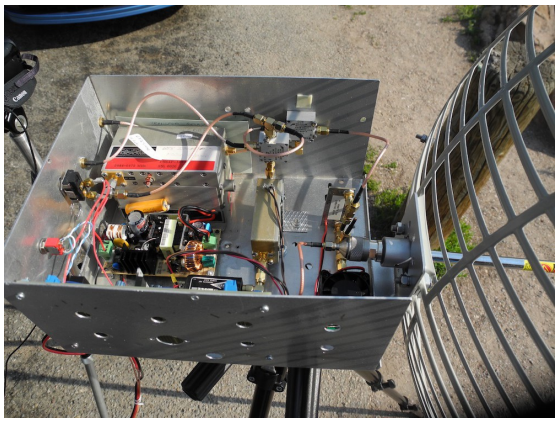
Using the known system parameters, a *Radio Mobile* rf path prediction was run. The KH6HTV system parameters were: transmitter power = +23dBm, both antenna gains = +23dBi, transmit coax loss = 0.4dB, receive coax loss = -3.5dB

Radio Mobile predicted -65.3dBm. However, *Radio Mobile* includes several fudge factors above the Free Space Loss of 126.7dB. It included Obstruction Loss of -3.86db, Forest Loss of 0.0dB, Urban Loss of 1.0dB, and Statistical Loss of 6.61dB for a total path loss of 130.4dB, or a net difference of 3.7dB over free space. If we take this away from the predicted -65.3dBm, we end up with the free space prediction of -61.6dBm. This result is quite amazing in that Don measured -62dBm, essentially the same. Plus the resolution on the Hi-Des S meter is only to the nearest 1dB. Thus on this particular path we were experiencing true free space propagation. Plus, we had almost a 40dB margin.

Jim, KH6HTV, Boulder, Colorado

The first six photos were taken by still camera.

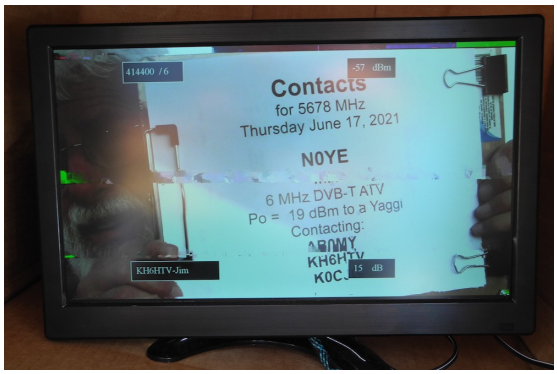
Bill's 5.8GHz Transverter & Antenna



Inside view of Bill's Transverter

Jim (foreground) & Bill's DATV set-ups

View from Legionaire's Hill - from N0YE



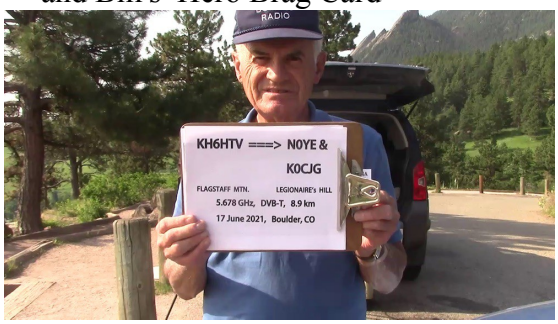
Images on KH6HTV's monitor: K0CJG's QSL & N0YE ID card. . note some break-up

The following photos were screen grabs off of video received and DVR recorded.

Bill, AB0MY's rig & SUV

--- and Bill's Hero Brag Card

Jim, KH6HTV's rig and convertible



-- and -- his Hero Brag Card


Video received by KH6HTV from Chris, K0CJG

NEWS FROM ACROSS THE POND

Noel, G8GTZ writes ..... "*Jim -- You may be interested to know that BATC is doing some very interesting work on Narrow DVB-T, 2,000 carriers down to 250KHz. The main code has been written by Charles G4GUO who is part of the Express team and BATC has developed Portsdown transmit and receive for it. We will also be implementing it in our Ryde repeater receiver and digital set top.* https://wiki.batc.org.uk/Knucker https://wiki.batc.org.uk/Ryde_Receiver *We think there will be a lot of interest in the US for this project. It may also be worth stressing to the US community that the Knucker is compatible with HiDes equipment both on Tx and Rx."*

The British Amateur Television Club's (BATC) major effort to add DVB-T is documented in their latest **CQ-TV** newsletter. (Spring 2021, No. 271). With their kind permission, I am reprinting Noel's introduction article here in this issue of our ATV newsletter as it is of major interest also to USA, DATVers. There are also two additional follow-on articles by Dave, G8GKQ, discussing in more detail the BATC, reduced bandwidth DVB-T receive and transmit systems. I will be reprinting them in the next issue of this newsletter.

Reduced Bandwidth DVB-T for DATV Use

Noel Matthews, G8GTZ

As a result of tests carried out during 2001 at GB3AT in Winchester, the UK and subsequently the European ATV community adopted DVB-S as its standard for amateur digital TV transmissions (see CQ-TV250 page 40).

At the time, the major benefits of DVB-S (single carrier QPSK designed for satellite) were identified as the variable bandwidth capability which allows operation today down to 50 kHz and requiring less linear PAs than wideband DVB-T, which was only then available in six, seven or eight-MHz bandwidths.

However, it was known at the time that the major advantage of the terrestrial DVB-T standard was, due to the use of COFDM (Coded Orthogonal Frequency Division Multiplexing) technology, the resilience to multipath and phase distortions which appear as ghosting on an analogue TV.

This is particularly true for mobile transmission and reception, particularly in built-up areas (see results from the maritime mobile tests conducted on the Solent in CQ-TV 245 page 15) and is the reason why today all wireless broadcast cameras use OFDM-based technologies.

Multipath and phase distortion also become a problem for ATV operators when trying to take advantage of enhanced propagation particularly on the lower VHF and HF bands where modes such as sporadic

DVB-T vs. DVB-S

Unlike DVB-S which uses one data carrier on a single radio frequency (RF) channel, DVB-T makes use of COFDM. This works by splitting the digital data stream into many slower digital streams, each of which digitally modulates a set of closely-spaced adjacent sub-carrier frequencies.

In DVB-T there are two choices for the number of carriers known as 2K-mode or 8K-mode. Note there are actually 1,705 or 6,817 sub-carriers. These close-spaced signals would normally be expected to interfere with each other, but by making the signals orthogonal (at right angles) to each other, there is no mutual interference.

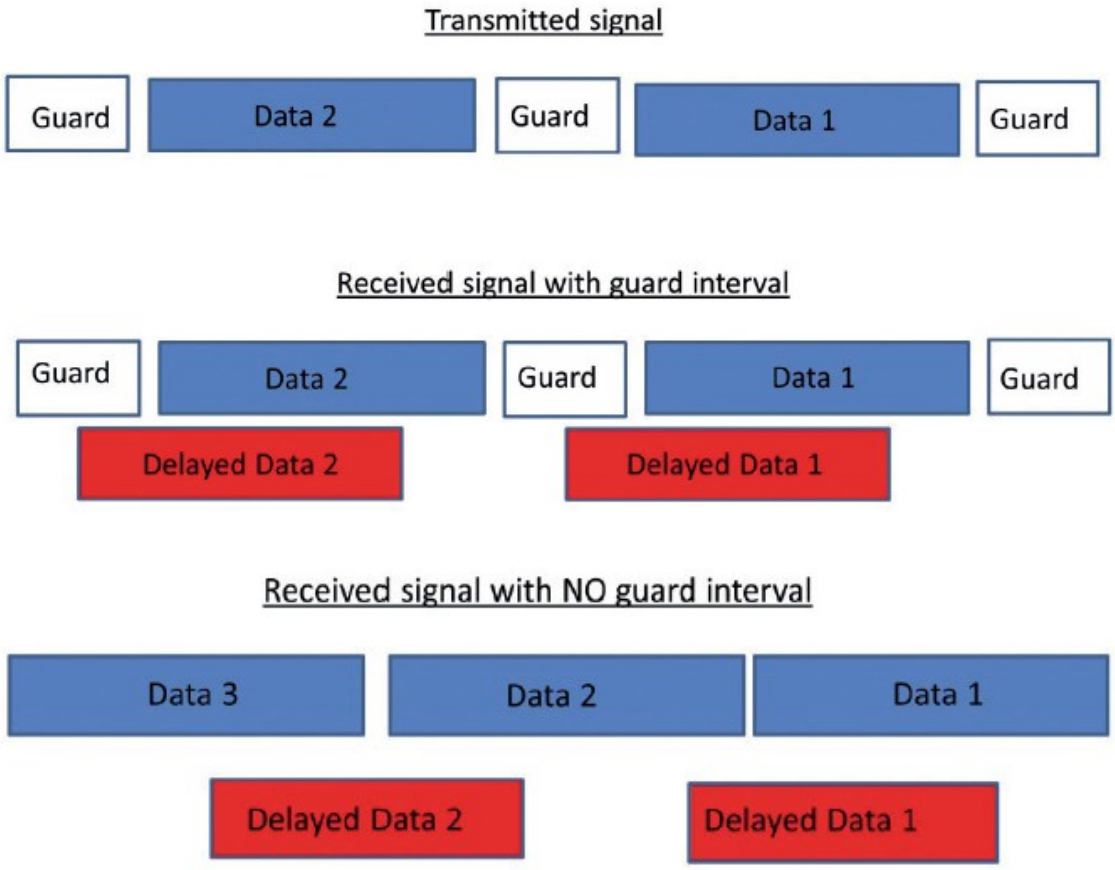
The data to be transmitted is shared across all the carriers and this provides resilience against frequency selective fading from multi-path effects. Nulls caused by multi-path effects or interference on a given frequency only affect a small number of the carriers, those remaining being received correctly.

These individual carriers can be modulated using QPSK, 16 or 64 QAM with the benefit of increasing the amount of data carried but at a cost of increasing the SNR and the amount of signal required to achieve successful decodes. Forward Error Correction (FEC) is also applied to each carrier which also affects the robustness of the signal and amount of data carried.

Some of the carriers don’t carry traffic but provide phase and amplitude references to help the receiver decode the signal and others provide information on the format of the signal again to help the receiver do the decoding.

Guard Interval

One significant difference between DVB-S and DVB-T is that OFDM also uses a technique called guard interval to improve multipath performance. When trying to understand guard interval, it is important to think in the time domain rather than frequency domain. The damage done by multipath is when reflected signals (or digital symbols) arrive after the direct signal or symbol and at the same time as the next symbol of information and thereby corrupting it.



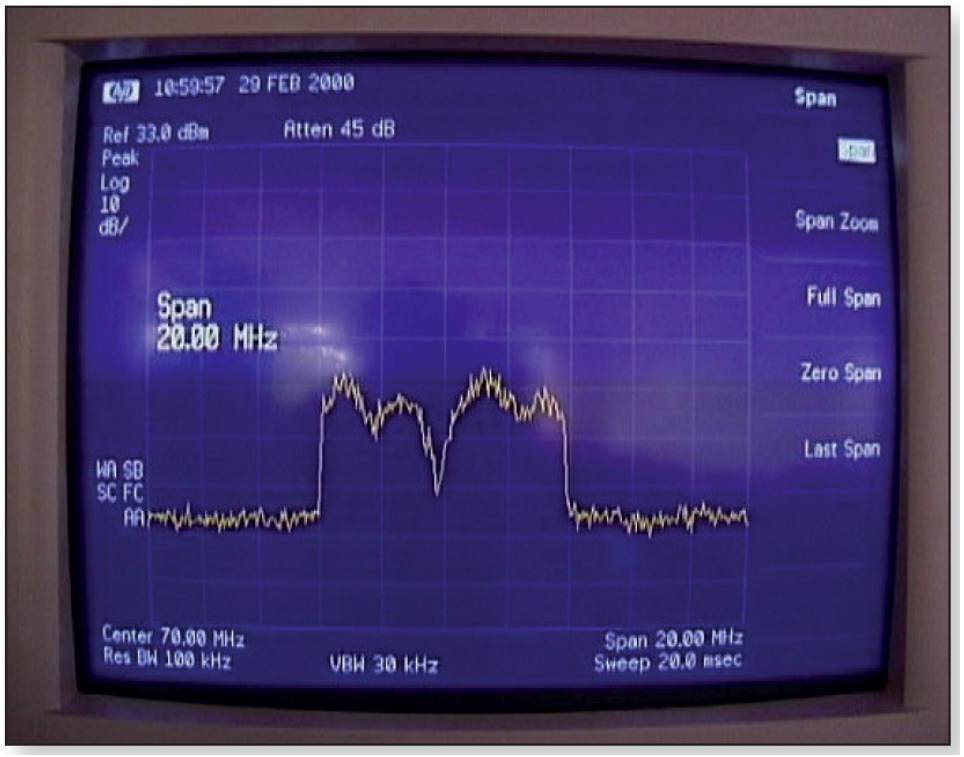
A guard interval (or time delay) is added to the beginning of each symbol of data, thereby ensuring any reflections from the previous symbol have been received before the data in the second symbol starts. Any corruption to the first data block by its own delayed reflection can be dealt with by error correction. Note that a longer guard interval results in a reduction of the payload bits available and therefore reduces picture quality.

Guard Interval Duration

As mentioned previously, DVB-T was designed as a PAL replacement system and the guard interval was set to compensate for typical reflection delays seen on a domestic TV using “rabbit’s ear” antennae. With the PAL line scan duration of 64 microseconds, typical ghosting of up to 10 microseconds could be seen before the sync waveforms were too distorted for the set to lock.

With an eight-MHz bandwidth, the maximum guard interval can be set to 1/4 or 56 microseconds and the Freeview SD multiplex currently operates at 1/32 or seven microseconds.

With reduced bandwidth DVB-T, the length of the guard interval directly scales with the reduction in bandwidth and the 1/32 setting gives a guard interval time of 112 microseconds at 500 kHz and 168 microseconds at 333kHz.



The effectiveness of the combination of multicarrier modulation and the guard interval can be seen in this spectrum analyzer plot showing an eight-MHz OFDM signal with 20dB notch caused by mobile multipath and frequency selective fading but signal decoding was not affected.

PA Linearity

One requirement of the OFDM transmitting and receiving systems is that they must be very linear.

Any non-linearity will cause interference between the carriers because of inter-modulation distortion. This will introduce unwanted signals that would cause interference and impair the orthogonality of the transmission.

In terms of the equipment to be used, the high peak to average ratio of multi-carrier systems such as OFDM requires the RF final amplifier on the output of the transmitter to be able to handle the peaks although the average power is much lower and this leads to inefficiency. Typically power amplifiers should be run at only 10% of their rated power output when DVB-T is used.

Why DVB-T for DATV now ?

As mentioned previously, as DVB-T was originally only available in fixed six, seven and eight-MHz bandwidths with a 1.7 MHz variant being developed more recently. These wide bandwidths meant PA linearity was a real issue and for typical amateur applications DVB-S was more efficient although the ATV community in the USA has adopted DVB-T using HiDES equipment.

However, a recent development in silicon technology has meant there is now variable bandwidth DVB-T tuner silicon available that will go to bandwidths below 1 MHz and Charles, G4GUO, has developed core software core to enable its use in amateur applications.

Charles has also developed transmit code to enable DATVExpress and Portsdown systems to transmit narrow band DVB-T down to 250 kHz.

These core developments by Charles have now been used for the basis of the Knucker narrowband DVB-T project which includes a new USB receiver card and DATVExpress and Portsdown transmit capabilities.

Where Should We Use DVB-T ?

DVB-T is NOT a replacement for DVB-S and there is no need to upgrade or replace anything if you do not want to take advantage of the two very specific applications for DVB-T.

Low band VHF and HF DATV

Up until now it has been impossible to use DVB-S based DATV on the lower VHF or HF bands to take advantage of enhanced propagation because certain modes such as sporadic E are not phase coherent. However, it is believed that reduced bandwidth DVB-T will be more resilient and enable ATV operators to take advantage of the recent introduction by IARU Region One of segments for digital experiment in the 29 and 50 MHz bands.

VHF and UHF mobile DATV

It is also envisaged that narrow band DVB-T will enable the use of reliable mobile transmissions on VHF and above and opens up the opportunity for amateurs to develop new repeater and wireless camera applications.

Summary

Reduced bandwidth DVB-T will not replace DVB-S as the preferred technology for most of our applications such as simplex and home station to repeater transmissions or when operating on QO-100.The development of the reduced bandwidth DVB-T capability does give DATV operators the opportunity to explore new applications and could enable fast scan digital Television QSOs around the world.

Live, Fast Scan, Digital TV on 10 & 6 meters !

Did you catch Noel's mention about this in the above article ? Apparently, the IARU is now allowing for region one, wide band, digital experiments in the 10m and 6m bands. Whow ! Talk about a major break-through ! Over in Europe they have already been doing DATV on 2 meters and they also have a band at 70MHz which we don't have here in the US. Maybe if they are successful in demonstrating narrow-band, digital TV, the FCC authorities here in the US, might also be persuaded to open up at least part of 10 & 6 meter bands for us to also experiment with. Our 2 meter band is already quite full with lots of other activities, so I would not advocate we ask for DATV on 2 meters.

The BATC is now suggesting that DVB-T signals on 10 meters use 29.25 MHz center frequency with 333 kHz QPSK and no more than 500 kHz bandwidth. They are also suggesting with the same digital parameters, 51.7 MHz, 71.0 MHz, and 146.6 MHz for those other bands.

While we in the US are not allowed to transit video on these bands, there is no rule saying we can't listen (ops, I mean watch !) for these signals coming across the Atlantic. Now that we are entering into a new sun spot cycle things are picking up on the higher HF bands and a 10 meter opening to Europe becomes more possible. Just in the last two weeks, I made my first 10 meter, SSB contact in at least a couple of years.

Jim, KH6HTV, Boulder, CO

ATN-Arizona: The ATV gang in Arizona is once again meeting in person for eyeball QSOs. Rod, WB9KMO, writes ---- " *The VOAR meet up is in-person again ! We hope to see you at Denny's in Tempe. Our meetings will start at 6:30pm. You can also join us online at www.whereby.com/atn1 but in-person is preferred. Everyone interested in Video on Amateur Radio is invited to attend. We discuss and demonstrate Video Creation and Editing, Amateur Television, Mesh Networking, Mesh Video, Balloon and Drone Video and Video in Space. We encourage you to bring a video along to share, though that isn't required.*" For more details, contact Rod at: wb9kmo@gmail.com

ATV-QSO PARTY: The Aussies are once again going to sponsor this ATV party. So put on your calendars Friday August 27th and Saturday August 28th (note: Eastern Australian Time Zone). Our Sept. 2020 ATV newsletter (issue #55) documented last year's QSO party.

Peter, VK3BFG, writes ....." *VK3RTV Melbourne will be HD by then with Melbourne stations transmitting DVB-S2 up and VK3RTV responding with DVB-T2 down. This will be before Australian commercial stations have adopted this latest second generation upgrade."*

Known Digital-ATV DX Records

updated 2020-10-13

by Ken W6HHC

76 GHz

35.6 KM G8GTZ/P & G4LDR/P 2019-01-26
DVB-S2 at 333 KS/s RB-DATV.
Locations Coombe (IO91GI) and Cheesefoot Head (IO91JB)

12 KM G8GTZ/P & G4LDR/P 2018-08-10
DVB-S at 250 KS/s RB-DATV.
Locations IO90LX and IO90LU

47 GHz

115 KM JA0RGP/0 & JA0RUZ/0 2015-06-07
DVB-S protocol - each station SR-Systems exciter SR=6000KS/s - 150 mw final out
Locations PM97MT (Niigata City) and PM98FV (Nozawa Onsen Ski Resort)

24 GHz

138 KM G8GTZ/P & G4FRE/P 2019-08-09
DVB-S2 Protocol - 333KS/s FEC=1/2 approximately 0.5 watt, 60cm dishes
Locations Dunkery Beacon (IO81FD) and Cleeve Common (IO81XW81)

124 KM JA8DME & JA6EES 2011-11-12
Locations Mont Ten-Zan and Mont Ge-Zan

113 KM JA0RGP to JA0RUZ 2020-08-20
ISDB-T JA0RUZ EMB220 TX at 150mw out JA0RGP HV-320J at 300 mw final out
Locations PM97LU (Niigata City) and PM98FV (Nozawa Onsen Ski Resort)

10 GHz

463 KM JA0RUZ & JA0DAE 2012-07-28
DVB-S protocol SR-Systems exciter SR=6000 KS/s
Locations Akita prefecture (Cold Wind Mt) and Toyama prefecture (Mt.Iozan)

450 KM HB9UBC & F4CXQ 2008-06-21
Locations JN40CT (Sardinia) and JN12OH (Spain)

407 KM M0DTS/P & G4UVZ 2018-10-24
Intense tropo-ducting all bands. RB-DATV using DVB-S at 125 KS/s & 333 KS/s
Locations IO94MJ (Danby Head) and IO80KX (Hollybank Blagdon Hill)

258 KM F1MPE/P & HB9AFO 2019-09-14
DVB-S at 333kS/s using Portsdown exciter - HB9AFO w/ 8W out and 1M dish
Locations JN26JL and JN36GN reflections against Mont Blanc

167 KM JA0RGP/0 & JA0RUZ/0 2020-08-10
ISDB-T protocol - 64QAM OFDM FHD with self-made TX at 500mw final out
Locations PM98FV (Nozawa Onsen Ski Resort) and PM98RE (Murikami City)

5.7 GHz

464 KM JA0DAE/9 & JA0RUZ/7 2012-07-28
Locations PM86JM and PM99WW - DVB-S - AR Sys and SR-Sys exciters

341 KM JL1BUF & JH1GED 2011-08-06
Locations Mont Chokai-san and Mont Kashimayari-gatake - DVB-S SR-Systems

287 KM JA0RUZ/9 & JA4JKE/4 2018-08-02
ISDB-T - JA0RUZ using XHAED-2 TX - JA4JKE use HV-320J - at 500mw final out
Locations PM86JS (Tottori City) and PM75AM (Mt Hodatsu)

167 KM JA0RUZ & JA0RGP 2020-08-10
ISDB-T protocol - 64QAM OFDM FHD with self-made TX at 500mw final out
Locations PM98FV (Nozawa Onsen Ski Resort) and PM98RE (Murikami City)

3.4 GHz

154 KM GW4CBW/P & G3NWR/P 2018-08-10
DVB-S at 333 KS/s RB-DATV. Locations IO83FD and IO84ML

2.4 GHz

~ 1000 KM OR4ISS to IØKPT (one-way) 2014-03-08
~ 1000 KM OR4ISS to IK1SLD (one-way) 2014-03-08
Initial DVB-S protocol live video transmissions from HamTV in orbit aboard ISS
SR = 1.34 MSymb/sec and 2.0 MSymb/s using SR-Systems exciter & MPEG2
Locations Orbit to Matera, Italy and also Orbit to Casale Monferrato, Italy

252 KM JA8SPI & JA5MFY 2009-11-03
Locations PM63LN and PM51PS SR-Systems exciter and loop-yaggi

1.2 GHz

440 KM G4KLB to G1LPS 2010-10-11
Locations IO90BR and IO94EQ
(tropospheric ducting - one-way DATV)

419 KM G4KLB & MØDTS 2010-10-11
Locations Bournemouth, England and Yarm, England

379 KM VK3RTV(Repeater) & VK7EM 2011-02-23
(operators VK3BFG, VK3DQ , VK3WWW and VK3TRX)
Locations Mount Dandenong, Victoria and Penguin, Tasmania

Known Digital-ATV DX Records - Page 2

updated 2020-10-13

by Ken W6HHC

1.2 GHz - continued

252 KM JA5GYU & JA8JNR 2009-11-03
(1 Watt)

70 CM

696 KM F1FY to G8GTZ 2013-09-24
(DVB-S 2MS/sec FEC=1/2 - - one way reception)

696 KM G8GTZ to F1FY 2013-09-25
(DVB-S 2MS/sec FEC=1/2 - - one way reception reported by FM)
Locations IO91KH (near Basingstoke) and JN16VB (near Roanne, France)

600 KM DBØTAN (repeater) to F9ZG 2014-11-28
DVB-S - one-way DATV - Tropospheric ducting (signal 25 dB S/N over ca)
Locations Wasserkuppe (Germany Hesse state) to IN99KC (Normandy France)

528 KM G3PYB & F5AGO 2013-09-24
(DVB-S 2MS/sec)
Locations near W YORKSHIRE and JN06DP (near Poitiers, France)

501 KM W4HTB & WB8LGA 2014-07-26
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting
Locations Bowling Green, KY and Marengo, OH

235 KM G8GTZ & F9ZG 2018-08-12
H.264 video - DVB-S protocol at 125 KSymb/s using DATV-Express w/ 19-ele yagi
Locations JO00HU (Fairlight near Hastings) and IN99KC (near Cherbourg)

121 KM KH6HTV to KØRZ 2011-11-21
(video resolution HDTV 1080i - protocol ITU-T/J.83B QAM-64 - one-way DATV)
Locations Cheyenne, Wyoming and Boulder, Colorado

144 MHz

407 KM M0DTS/P & G4UVZ 2018-10-24
DVB-S at 333 KS/s RB-DATV.
Locations IO94MJ (Danby Head) and IO80KX (Hollybank Blagdon Hill)

403 KM PI4D to G4YTV (one way) 2020-08-22
DVB-S2 at 125 KS/s using H265 with FEC=1/2 on 144.600 MHz. (100W into Yagi)
Locations Dordrecht , Netherlands and IO93JU82FR (East Yorkshire , England)

380 KM PA0JCA to G4YTV (one way) 2020-08-22
DVB-S at 125 KS/s using H264 with FEC=1/2 on 145.300 MHz. (80W into 4el Yagi)
Locations Amstelveen Netherlands and IO93JU82FR (East Yorkshire , England)

313 KM GI7UGV & G4CBW 2018-07-14
tropo-ducting - H.264 video - 8W DVB-S protocol at 333 KSymb/s with Portsdown tx & MiniTiouner rx with 7-ele yagi at GI7UGV. G4CBW used DATV-Express tx (7W) & MiniTiouner with 5-ele beam. - on 146.5 MHz - UK temporary band allocation
Locations IO74AU93XP (Larne, N. Ire) and IO83UB93 (Newcastle-Under-Lyme)

294 KM G0MJW/A & G8LES 2016-12-29
tropo-ducting - H.264 video - DVB-S protocol at 125 KSymb/s with DATV-Express and 9-ele yagi at GØMJW. G8LES also used DATV-Express with 10-ele X-yagi. Both produced 25W ERP. - on 146.5 MHz - UK temporary band allocation
Locations IO83RO (Winter Hill) and IO91LC (Four Marks)

50 KM MØDTS & G0LPS 2015-02-21
H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express transmitters & MiniTiouner RB-DATV receivers. 146.5MHz UK temp band allocation
Locations North York Moors, England and Spennymoor (County Durham) IO94EQ

70 MHz

230 KM G4FRE to G4FRE/P (one-way) 2018-12-27
DVB-S protocol - Pluto xmtr at 250 KSymb/Sec with FEC=7/8 and 5-ele beam
Locations Malvern (IO82UC) to Isle of Sheppey (JO01KK)

160 KM G8GTZ/P & G4FRE/P 2018-12-09
DVB-S protocol - Portsdown 125 KSymb/Sec FEC=7/8 & 5-ele beam on 71.0 MHz.
Locations Win Green (IO80WX) and Titterstone Clee (IO82QJ)

136.6 KM G8VPG & G4BVK 2018-09-14
H.265 video - DVB-S protocol at 333 KSymb/s with DATV-Express transmitter, MiniTiouner receiver and 3-ele yagi at both stations
Both transmitted 20W - on 71.0 MHz - UK temporary 4M band allocation
Locations IO81FD19QU (Dunkery Beacon) and IO81XW90 (Cleeve Hill)

50 MHz

228 KM G4FRE to G4FRE/P (one-way) 2018-12-26
DVB-S protocol - Pluto 250 KSymb/Sec with FEC=7/8 & 5-ele beam on 51.0 MHz.
Locations Malvern (IO82UC) to Isle of Sheppey (JO01JK)

140 KM G4FRE/P & G8GTZ/P 2019-04-06
DVB-S2 protocol at 250 KSymb/Sec with FEC=1/2
G4FRE used Portsdown/MiniTiouner with 5-ele F9FT yagi
Locations Titterstone Clee (IO82QJ) and Walbury (IO91GI)

See more details (including analog-ATV and SSB, etc) at https://www.hb9afo.ch/records/default.htm

Thanks to Ken, W6HHC, for compiling this list of DX records www.w6ze.org

W0BTV Details: **Inputs:** 439.25MHz, analog NTSC, VUSB-TV; 441MHz/6MHz BW, DVB-T & 1243MHz/6MHz BW, DVB-T
Outputs: Channel 57 --- 423MHz/6MHz BW, DVB-T, or optional 421.25MHz, analog VUSB-TV. Also, secondary transmitter, FM-TV output on 5.905 GHz (24/7).
Operational details in AN-51a Technical details in AN-53a. Available at: *https://kh6htv.com/application-notes/*

W0BTV ATV Net: We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time. The net typically runs for 1 to 1 1/2 hours. A DVD ham travelogue is usually played for about one hour before and 1/2 hour after the formal net. ATV nets are streamed live using the British Amateur TV Club's server, via: *https://batc.org.uk/live/kh6htvtvr* or *n0ye*. We use the Boulder ARES (BCARES) 2 meter FM voice repeater for intercom. 146.760 MHz (-600kHz, 100 Hz PL tone required to access).

Newsletter Details: This is a free newsletter distributed electronically via e-mail to ATV hams. The distribution list has now grown to over 450. News and articles from other ATV groups are welcomed. Permission is granted to re-distribute it and also to re-print articles, as long as you acknowledge the source. All past issues are archived at: *https://kh6htv.com/newsletter/*

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