

ITU/ASBU Workshop on Frequency Planning and Digital Transmission

Damascus

Migration from Analogue to Digital

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Migration of Analogue to Digital?

- *Such an easy question to ask;* but the answer is not simple and can be roughly be divided into a political answer and an engineering answer.
 - But these are intermingled and require clear direction from both to achieve a common answer
 - Some of the political questions could be
 - How many programmes do I want for the future?
 - When do I want to go digital?
 - When do I switch off the analogue services?
 - What coverage do I want to achieve?
 - What type of services (mobile? Portable? Fixed?)
 - How do I get to the point where I can switch the analogue services off?

Migration of Analogue to Digital?

- Some of the Engineering questions could be:
 - Given a number of programme requirements
 - What system variant do I use?
 - Is my current infrastructure up to the job?
 - How many UHF /VHF channels do I have to use
 - Will I be re-using existing assignments
 - Am I planning to replicate the current coverage
 - Are any of the services new?
 - Such as mobile DVB-T or DVB-H

Spectrum Planning Issues

- What are the implications from the output of the first session of the RRC04?
- What co-operation will exist with co-ordination countries prior to the second session?
 - This could determine the input requirements
 - What Reference planning configuration am I using and will it be compatible with neighbours who may not use the same RPC
 - How will I implement any spectrum plan
 - Will there be interference within my host country

Spectrum Planning issues (2)

- In planning a DTT network there are two threads:
 - A coordination thread leading to an allocation of a channel in either a specific assignment or allotment area.
 - How to turn that assignment/allotment into a real network that can be received.
- The coordination process involves an agreed set of parameters with minimum field strengths etc. But this assumes the viewers systems are the same as specified in the procedures (they rarely are!!).

Ideal receive antennas?

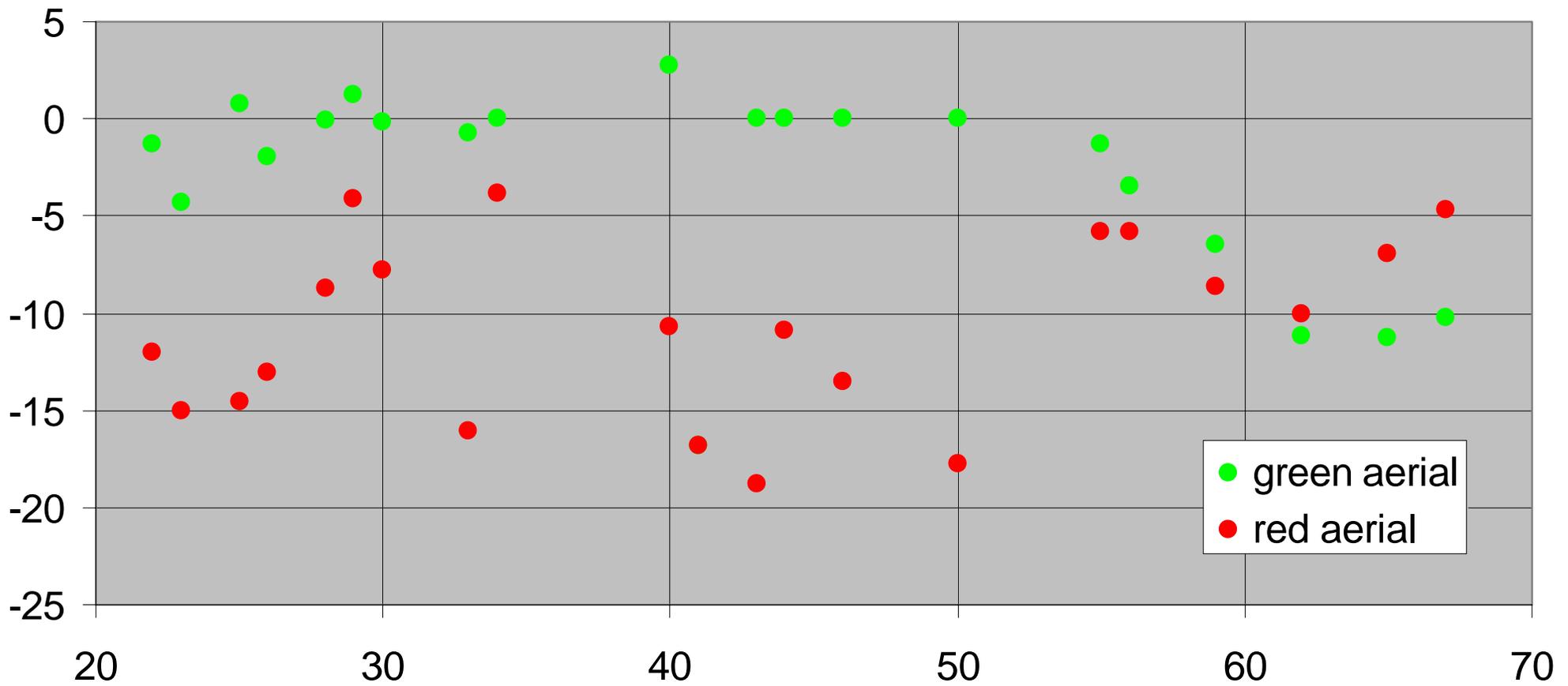


Familiar?

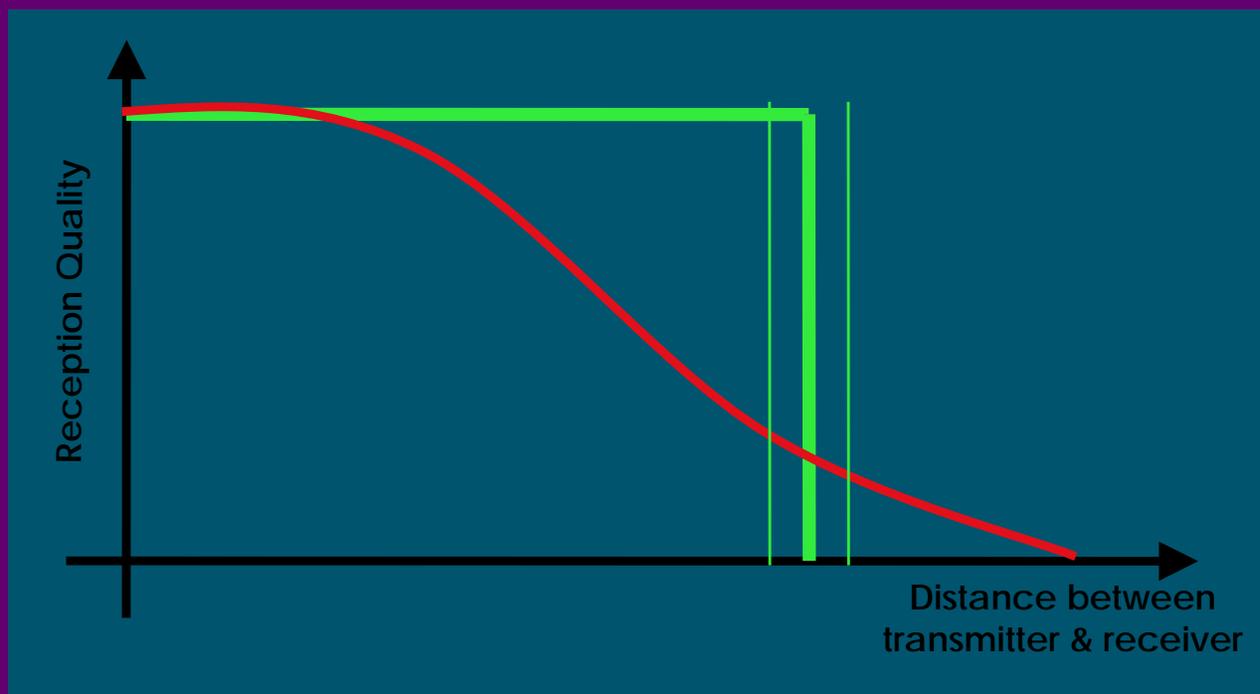


Ideal Aerials? Nominal gain is supposed to be 10dBd
Log periodic is 7-8dBd.
The red antenna is very poor and the green is not great!

Gain compared to log-periodic



Reminder of the Brick Wall effect



Analogue TV

The reception quality directly depending on the field strength. With growing distance the reception quality continuously decreases.

DVB-T

The transition from covered to not covered area is very sharp. The position can slightly vary according to atmospherical (weather) changes.

So where are we heading?

- For a successful migration from analogue to digital it is important from a spectrum planning perspective to:
 - Match or exceed analogue by:
 - Radiating the maximum amount of power possible from existing sites to ensure high percentage location probability coverage
 - This could be as much as -7dB below current analogue (for UHF, however if UHF is used to replicate VHF then the power levels must be approximately the same)
 - Any new services have to be planned carefully to ensure no interference to existing (primarily due to the possibility of not being co-sited and therefore there is the possibility of adjacent channel interference or overloading of front end receivers)

How can we achieve the coverage requirements

- The simplest and easiest is to convert the existing analogue service
 - This has the advantage that current viewers should be able to receive the service with no changes as the signal level will be adequate to receive the digital service because the DVB-T is only a few dB's down on the analogue
 - There are no interference issues with a direct conversion as this is taken into account with the different protection ratios and ERP differences

How can we achieve the coverage requirements

- If a network plan is based on conversions, these already exist in the current analogue lattice and are therefore already mutually compatible
- Much of what is being planned in Europe is based on conversions (in some countries this is not a direct conversion, but uses the compatibility of the analogue to produce SFNs). However the converting of the analogue into an SFN which covers a larger geographic area will cause interference to other assignments/allotments using the same channel.
- The use of SFNs which extend the existing analogue coverage area, will need to be co-ordinated. The question is, when? Do you let it go into the compatibility analysis (and potentially lose?) or pre-agree with neighbours?

How to get to being able to switch off the analogue services

- It will be difficult to just change from analogue to digital overnight. Therefore a DVB-T service must exist with roughly similar coverage to the analogue.
 - To ensure the market already exists
 - That there are sufficient digital receivers already in people homes
 - Once a sufficient number of viewers have digital capable equipment then a plan to switch off analogue can proceed

Planning a Simulcast DTT service

- To achieve a simulcast DVB-T service it must co-exist in the same frequency band (or have similar coverage to band III analogue).
- It must therefore must not cause interference to existing analogue services.
- Must be compatible with neighbours analogue and potentially digital networks
- It will be necessary to do some initial planning work with neighbours so that a fair share out of frequencies is obtained from the RRC process and that the input requirements have a good chance of success (of course you could leave to the process itself, but there will no guarantees that the outcome will be acceptable).

Output of RRC First session

some notes

Outcome of the First Session

- Resolutions and Report to the Second Session
- Definitions
 - Lower power stations – 250W ERP for UHF
 - Existing and planned only includes fully agreed and entered into ST61 plan by a certain date
 - T-DAB allotments entered into plan but no additional protection
- Propagation
 - Propagation curves based on ITU Rec 1546
- Technical Bases
 - Receiving aerial polarisation discrimination included if requested
 - Fixed, portable or mobile reception can be specified for DVB-T
 - Reference networks for allotments agreed
 - Tables of minimum field strengths and protection ratios agreed

Outcome of the First Session (2)

- Planning Principles and Methods
 - Equitable access is a general principle – as yet no specific limit on the number of requirements per area
 - SFNs and MFNs can be dealt with in the planning process
 - Allotments and assignments can be specified
 - The planning process will consist of a compatibility analysis (defined in the Report) and a plan synthesis
 - Multilateral discussions an integral part of the planning process
 - Analogue conversions have no direct right of entry into the plan – they can be submitted as requirements, but are treated on the same basis as other reqs
- Submission of Requirements
 - A single channel or range can be specified in the input requirements
- Inter-sessional Activities
 - One planning exercise plus one draft plan
 - Groups created to oversee and carry out work (RPG, IPG, PXT)

The Planning Process

- Stages:
 - Submission of requirements (including fixed channels and/or conversion channels?)
 - Compatibility analysis by ITU
 - Following discussions, Administrations can specify requirements as being compatible
 - Synthesis of plan (assignment of channels to requirements where possible)
- Output of planning process
 - Channels assigned by process not known until end
 - Uncertainty that fixed or conversion channels will be delivered
 - Possibility that not all requirements will be satisfied

Status of Analogue Conversions

- No direct guaranteed right of entry into the digital plan
 - The Chester 97 conversion procedure allowed a conversion at -7dB relative to analogue ERP without co-ordination
 - This is not part of the RRC procedures
- Analogue Conversions will be a part of the process:
 - The main planning approach includes the possible use of conversions “to include some degree of compatibility with existing and planned assignments and allotments”
 - Existing and planned analogue stations protected either during the design or implementation of the plan
 - Fixed channels can be specified in the requirements
 - The inter-sessional groups are to draw up a conversion procedure
 - Both the UK and German/Swiss methods are included in the Report
 - Most of our neighbours’ plans are based on conversions – possible to agree on a bilateral/multilateral basis

Future Work....

- Involvement in inter-sessional work
 - Influence on detailed design of planning process and conversion procedures – how planning process deals with fixed channel plan
- Series of bilateral and multilateral meetings to agree plans with neighbouring countries
 - Work to agree any current plans
 - Compatibility with ‘channel potential’ method
- Development (and review) of plan
 - Preparation of requirements for planning exercises
 - Respond to feedback from planning exercises and multilaterals
- Preparation for Second Session in May/June 2006

TYPICAL DTT BUILDING



Satellite Distribution



EMLEY MOOR ANALOGUE/DTT CU



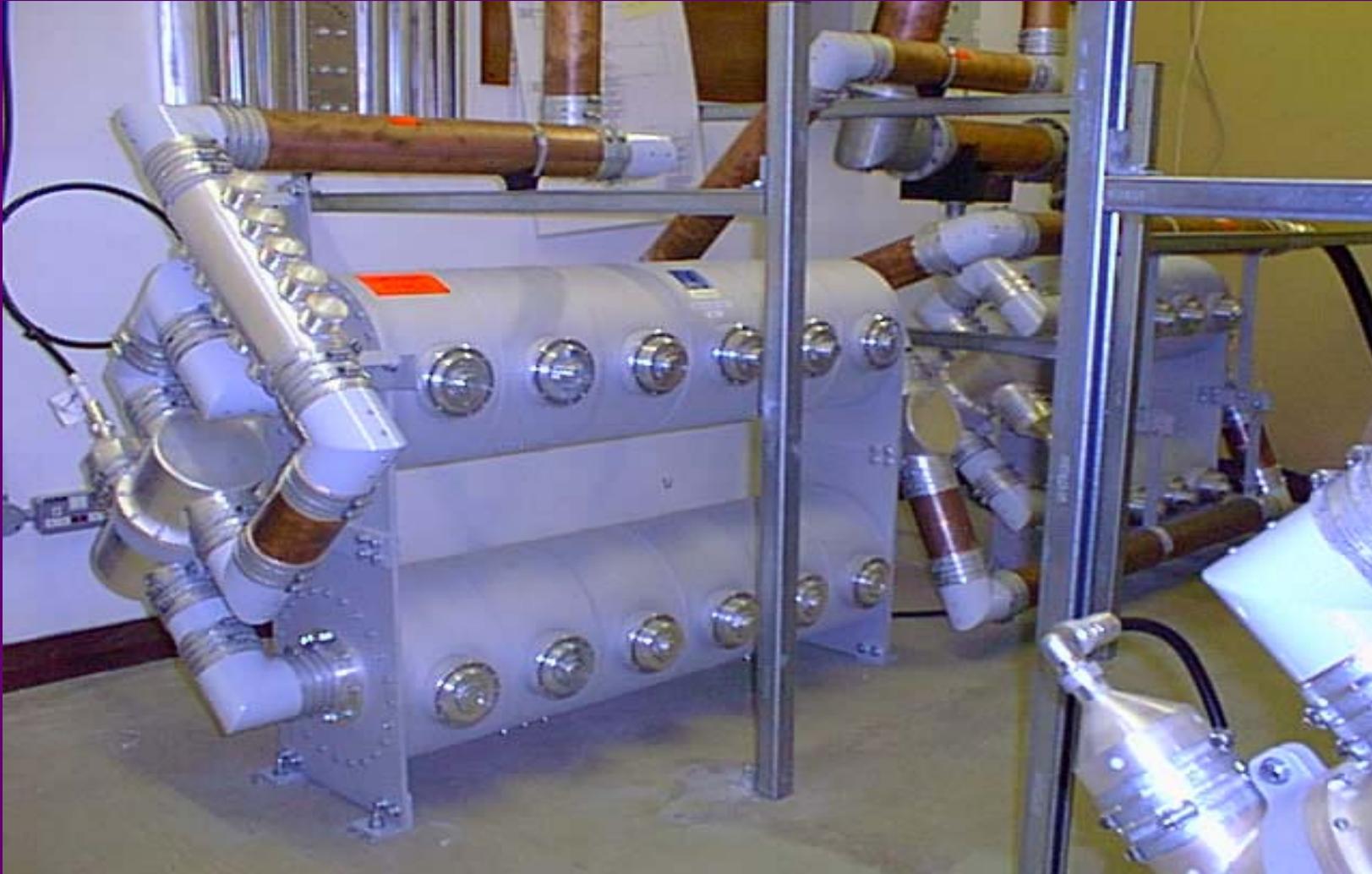
LANCASTER DTT CU (RELAY)



CHESTERFIELD DTT CU



PONTOP PIKE ANALOGUE/DTT CU



SANDY HEATH D3

Now replaced with newer antenna

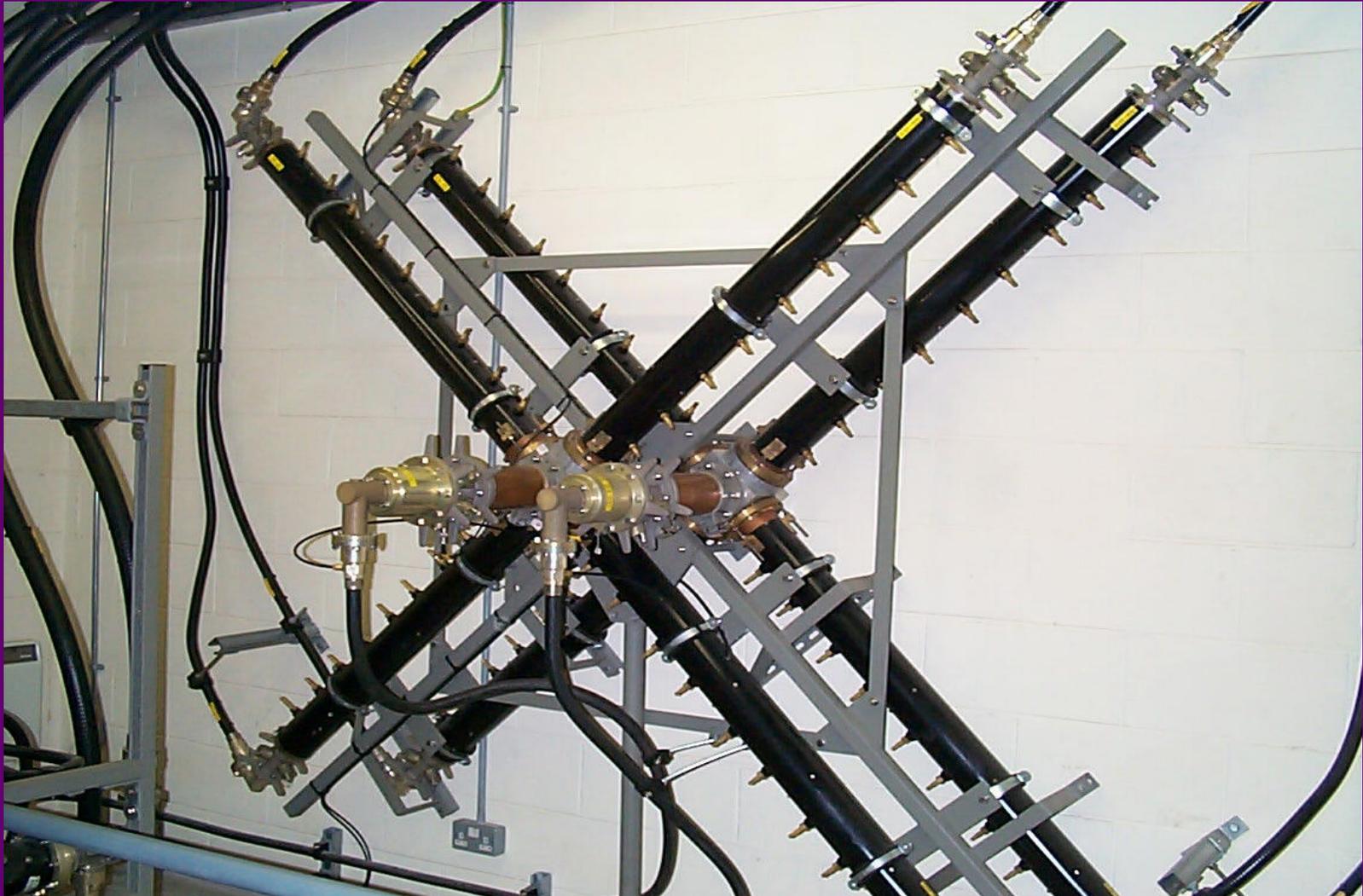


SANDY HEATH D1 AND D2

Original antennas since replaced



WINTERHILL ADC STARPOINT



TYPICAL EXAMPLES OF “THE BANE OF ANTENNA ENGINEERS”

