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Notes on Digital Terrestrial Television

Definitions and abbreviations

DVB-T – “Digital Video Broadcasting for Terrestrial” A digital terrestrial television standard widely implemented across the globe.

ISDB-T – “Integrated Service Digital Broadcasting – Terrestrial” A digital terrestrial television standard developed and deployed in Japan with a variant thereof deployed in Brazil and adopted by several South American countries

DTT – “Digital Terrestrial Television” terms used to refer to digital terrestrial television regardless of technology standard

HD – “High Definition” television

SD – “Standard Definition” television

ITU – International Telecommunications Union

RRC – “Regional Radiocommunications Conference” a regional conference convened by the ITU

GE-06 - The Geneva 2006 agreement - an agreement that was signed and acceded to by South Africa and all other SADC states that defines DVB-T as standard for DTT in ITU Region1 and on the basis of which all national frequency plans have been coordinated with their neighbouring administrations and filed with the ITU accordingly.

STB – “Set top Box” a device used to receive new digital television services and allow for the display of the received service on an existing analogue television set.

SADC - Southern African Development Community

Why Digital Broadcasting

- The analogue broadcasting systems are highly spectrum inefficient and unable to deliver the multichannel and interactive experience demanded by the modern day consumer.
- Digital Broadcasting will allow the provision of multiple new services and will provide far more efficient use of the available radio frequency spectrum.
 - DTT will accommodate multiple SD channels in the same bandwidth in which analogue TV systems would deliver only 1 channel.
 - SADC countries have prepared for the introduction of digital terrestrial broadcasting and have made their intention to migrate analogue broadcasting to digital known to neighbouring administrations as well as the ITU.
 - Because DTT makes more efficient use of the spectrum some broadcast spectrum will be released for new services once analogue broadcast transmissions have been switched off.
- Digital broadcasting promises the following benefits to viewers:
 - Better quality sound and pictures
 - More channels (additional content)
 - Possible access to radio services included on DTT
 - Enhanced viewer experience through for instance: electronic Programme guide (EPG), sub-titling, additional language options, and interactive services such as weather and news reports.

Why DVB-T

- DVB-T is the most successful Digital Terrestrial Television system world wide
 - DVB-T has been adopted by more than 120 countries
 - DVB-T has been deployed in more than 40 countries
 - More than 200 million DVB-T receivers have been sold
 - A wide selection of DVB-T receivers and set top boxes are available from many competing suppliers
 - DVB-T successfully delivers HD, SD and is deployed with MPEG2 and MPEG4 video compression technology
- Due to open nature of the DVB-T standard there is competition in all parts of value chain:
 - Suppliers compete on quality and features not uniqueness of standard.
 - There is healthy competition on product features and price from head-end manufacturers, transmitter and network equipment suppliers to the receiver chip-set manufacturers, STB manufacturers and even specialised test and measurement equipment suppliers.
- Due to the mass adoption of DVB-T high volume mass production of receiver chipsets, STB and integrated receivers in TV sets has occurred. This has resulted in cheap value rich receivers being available in many shapes and sizes and from many manufacturers and brand names.

Why not ISDB-T

- South Africa, SADC and the remaining countries in ITU Region 1 have after several years of planning adopted DVB-T as the basis for their respective national broadcasting frequency plans and for coordination of any broadcasts across international borders.
- ISDB-T and DVB-T are both first generation digital standards using the same basic technological features.
- ISDB-T performs on par with DVB-T¹
 - DVB-T requires slightly lower transmitter power to deliver a 2% greater data payload than ISDB-T
 - DVB-T networks can be deployed over larger areas than ISDB-T
 - There is no technical reason to consider a change from DVB-T to ISDB-T
- ISDB-T has to date not been deployed in an 8 MHz channel configuration anywhere in the world.
 - Significant development and implementation work is required before a commercially deployable 8 MHz ISDB-T network can be established.
 - 8 MHz ISDB-T STB are not commercially available
 - 8 MHz ISDB-T STB and chipsets are likely to be more expensive than existing ISDB-T STB as these would be based on a sub-variant of the ISDB-T standard and not be demanded or produced in large volumes.
- ISDB-T (6 MHz) STB in retail are significantly more expensive than DVB-T STB with equivalent technical capabilities^{2 3}.
- ISDB-T is an old 1st generation standard that is unlikely to attract significant R&D investment or see any revolutionary innovation.
 - The technology is likely to stagnate with little if any R&D investment or new developments emerging in the coming years.
 - The development of an 8 MHz version is not innovative neither is it revolutionary. It merely makes an old technology work in an 8 MHz bandwidth.
 - The massive investment required to industrialise the 8 MHz ISDB-T solution and commence with mass volume production runs is highly unlikely to be made for only a small fragmented market in a few counties.
 - R&D funds are likely to be allocated towards cutting edge technologies with massive medium- to long term demand and growth opportunities rather than old first generation technologies where markets are saturating (as is the case for ISDB-T in Japan) or consumers are unable to fund the expensive receivers (as is the case in Brazil).

¹ A detailed comparison based on performance data of the respective standard as published by the ITU is available on-line at http://www.sadiba.co.za/PDFfiles/SADIBA_analysis_of_ITU-R_BT1306-4_and_ITU-R_BT1877_20101027.pdf

² The National Association of Broadcasters (SA) commissioned Farcombe Consulting to research and report on pricing of ISDB-T STB found in retail in Brazil, the report is available in the Internet at http://www.nab.org.za/contentfiles/84_Farncombe%20Brazil%20Case%20Study%20Report%28final%29.pdf

³ The initial STB pricing study done in May 2010 was revisited in November 2010 to re-check the STB pricing situation in Brazil and include Argentina, Chile and Peru. No evidence of a USD 20-30 ISDB-T receiver was found. The updated receiver pricing study has not been published on-line. A copy can be obtained from the NAB at johann@nabsa.co.za

Why DVB-T2 rather than DVB-T (or ISDB-T)

- DVB-T2 is a 2nd generation standard. It is cutting edge technology currently attracting R&D funding for amongst others greater receiver chip-set integration and chip-set cost reduction as well as network infrastructure and technology deployment innovation.
 - The focus of R&D activities and spend in broadcasting today is on DVB-T2 world-wide
 - Investment in R&D funding and innovation in DVB-T is likely to stagnate.
 - Ongoing investment in R&D in DVB-T2 will result in further innovation and cost reductions for years to come
- DVB-T2 is commercially available and proven with STBs already being produced by competing manufacturers and competition in the chip-set manufacturing growing.
- There is wide-spread interest in and demand for DVB-T2 products and network roll-out in amongst others the UK, Sweden, Italy, Germany and India.
- DVB-T2 is between 30-67% more spectrum efficient than DVB-T (or ISDB-T). This efficiency can be put to effect by either configuring DVB-T2 networks
 - to deliver significantly more channels over the same coverage area and at the same network cost as would be the case with DVB-T; or
 - to operate at much lower power (only 1/4 of the power required)- and thus much lower network cost - delivering the same number of channels with same robustness in reception as would be possible via DVB-T.
- The greater spectrum efficiency of DVB-T2 will result in a greater digital spectrum dividend being yielded to other non-broadcast services that are seeking access to the broadcasting band.
 - The band 790 - 862 MHz that was formally part of the broadcasting band has already been identified as band to be vacated by broadcasters in order to allocate it to Mobile services and specifically the provision of wire-less data services over large geographical areas not densely populated.
- DVB-T2 is compatible with DVB-T and can be implemented within the agreed frequency plans as adopted throughout the region. (i.e. the GE-06 plan).
- DVB-T2 offers countries that have not implemented any DTT networks and where no STB have been sold, the unique opportunity to leapfrog a technology generation.
- By implementing DVB-T2 now the benefits for greater spectrum efficiency (i.e. greater number of channels / lower power operation as well as greater dividend spectrum) are secured in a single migration process.
 - Countries is that have a large DVB-T STB deployment are likely to see DVB-T2 networks being introduced alongside DVB-T networks with the DVB-T network remaining in operation for several years to come. Although this is the likely scenario for much of Europe, countries that have not rolled out DTT can migrate directly from Analogue television to Digital Terrestrial Television via DVB-T2 and avoid any interim stages.
 - Countries opting to go to DVB-T2 networks will only have to deal with dual illumination of analogue and digital services and migration once

- Countries opting to deploy DVB-T only now will be implementing an old technology that has already been superseded by DVB-T2.
 - It is almost inevitable that a further transition to a 2nd generation digital standard will be demanded by broadcasters, the telecommunications sector and the viewers.
 - Projections show that 2nd generation DVB-T2 STB will cost virtually the same as first generation DVB-T STB would within 3-4 years.
 - The downward price trend in DVB-T2 STB is already evident in the early commercial units sold in the UK.
 - Countries moving directly to DVB-T2 will reap the benefits for the greater spectrum efficiency of DVB-T2 in the short-term and will be doing so without the need for a second technology driven upgrade migration.
- Countries moving directly to DVB-T2 will be able to do so within the agreed time-lines and the termination of protection of analogue transmissions in ITU Region 1 on 17 June 2015.