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Federal Communications Commission
Office of the Secretary

May 16, 2005

Mr. Alan Stillwell
Senior Associate Chief
Office of Engineering and Technology
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: Requirements for Digital Television Receiving Capability, ET Docket 05-24

Dear Mr. Stillwell,

Pursuant to your telephonic request, Zoran Corporation (Zoran) hereby supplies certain information with respect to Digital Television converter boxes that would be capable of converting over the air ATSC signals to NTSC signals for display on legacy NTSC sets through the standard coaxial input of those sets. As you know, Zoran does not manufacturer set top boxes; rather it created the SupraHD™ 640 Reference Board, which includes a DTV receiver on a chip. (See the enclosed brochure.) It also has a complete ATSC DTV Reference Design that could be easily used by original equipment manufacturers to build large quantities of low cost converter boxes.

Zoran has a great deal of experience in producing full-function low-cost integrated circuits for various consumer electronics devices. Last year it produced silicon chips to enable some 42 million DVD players. That chip is a large part of the reason why a progressive scan DVD player can be purchased for $39.88. (See, *e.g.*, Kenwood model DF-3080S at http://www.vanns.com/shop/servlet/item/features/481099939?v_c=PriceGrabber) Accordingly, Zoran can provide the following predictions about DTV converter box costs at wholesale and retail. These estimates below, however, are highly dependent on a demand for large quantities of DTV converter boxes, in excess of 100,000 per month, towards a goal of deploying boxes at least in all households dependent on analog broadcasts by the end of 2006.

1. Assuming an order were placed today, Zoran believes that by fall of 2005, the boxes could be delivered at the OEM's loading dock ready to ship for USD50 each. Thus, by winter of 2005 the boxes could be selling in mass merchandise discount stores for around $65.
2. Assuming a ramping up of demand to 1M+ per month, by the beginning of fall 2006, Zoran estimates the retail price of such boxes to fall below $50. (The converter box is very similar to a DVD player, but with no moving parts.)
3. In addition, the SupraHD 640 Board under development is designed to be incorporated into today's analog 13-36" sets. Because it is about the size of an RF tuner can, Zoran believes that it can be incorporated into existing set design with little

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effort and rapidly. Initially, Zoran estimates that the increase in retail cost of such sets would be around $80-$100 depending upon the brand and model.

4. Again assuming a ramp up in sets incorporating the SupraHD Board, Zoran believes that by winter of 2006 the additional retail differentiation of such sets versus analog sets would fall below $70, still dependent upon the brand and model. Ultimately, it is believed that a number of functions currently in analog sets could be incorporated into the SupraHD chip further reducing the price differential, if not resulting in a lower cost set after a few years.

We hope this information is useful. If there is any other information we can provide, please do not hesitate to let us know.

Respectfully yours,

David Pederson
Vice President,
Corporate Strategic Marketing

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The Digital TV Policy Goal
Transitioning from analog over-the-air TV to digital TV as quickly as possible is a critical national telecommunications goal. Completion of the transition and reclaiming the analog TV spectrum for new public safety and advanced wireless services will generate billions of dollars for the federal government. However, it requires that all consumers must be able to receive DTV signals.

Currently, cable and Direct Broadcast Satellite (DBS) provide the primary access to TV for approximately 85% of U.S. television households. They will continue to provide TV access after the transition. However, some 15% of households that rely on over-the-air reception are likely to lose their TV service at the end of the transition. This is due, in part, to the expense of DTV receivers and the lack of affordable digital-to-analog converter boxes for legacy analog sets. Further, the lack of inexpensive DTV converter boxes will slow completion of the transition because of second and third unconnected analog sets in other rooms in the home.

Zoran Corporation Driving the Digital Lifestyle
Zoran Corporation, based in Sunnyvale, California, is a leading provider of digital solutions for the growing digital entertainment and digital imaging markets with over a quarter billion dollars revenue in 2004. Zoran has headquarters in the U.S. and operations in Canada, China, England, Germany, Israel, Japan, Korea, and Taiwan. Zoran-based DVD, digital camera, DTV, multimedia mobile phone, and multifunction printer products have received recognition for excellence and are now in over 150 million households.

With two decades of expertise developing and delivering innovative technologies, Zoran Corporation has pioneered high-performance digital audio video solutions for the digital home. Zoran is proficient in integrating analog and digital circuits into single chip solutions. Zoran's roadmap of highly integrated silicon products benefits its OEM customers by reducing system costs and time to market.

Zoran Corporation was a key enabler of the success of the DVD player market. Today one in every three DVD players shipping worldwide is powered by a Zoran processor. Zoran's integration expertise contributed to driving the DVD player price down to $50 for low-end models. More recently, Zoran solutions are contributing to mass market adoption of other products such as the $129 DVD-Recorder and $149 three-megapixel digital cameras. Zoran's roadmap has similar solutions for the DTV market including its SupraHD integrated digital television processors.

New Digital Technology
Zoran has designed and is demonstrating a self-contained digital-to-analog set top converter box based on its new SupraHD integrated DTV solution. The Zoran converter box receives an over-the-air DTV signal, coverts it to analog, and sends an improved analog signal to the legacy analog television set through its antenna input. The quality of the picture is similar to a DVD movie played on an analog television set. The Zoran box can be manufactured in large quantities for $50 FOB each. Zoran's SupraHD high definition television processor integrates all the necessary capabilities required to support the decoding and display of ATSC content while providing the lowest possible system cost.

Zoran, directly or through one of its manufacturing customers, can provide within a few months, low-cost digital-to-analog converter boxes if the government decides to subsidize low-income families that do not have cable/DBS service. In addition, jump-starting production of low cost converter boxes would result in retail availability of the boxes at around $67.50 within a year for second, third or fourth analog sets in consumers' homes. Consumers can also benefit from the fact that the Zoran solution enables manufacturers to produce 13" to 36" tube DTV sets that would retail for around $30-40 more than today's analog sets.

SupraHD-640
The SupraHD-640 DTV System IC decodes standard-definition and high-definition content. This IC is highly integrated, consisting of an MPEG-2 HD decoder, high performance CPU, powerful graphics engine, video scalar, video enhancement and other peripherals necessary for building an integrated DTV. Zoran's SupraHD-640 ATSC/NTSC reference design is a complete hardware and software solution for building an integrated Digital Television (DTV) targeted at the United States market.

Zoran's Digital Set Top Converter Box Solution
Zoran's set top converter box is a full-featured system that allows tuning, decoding, and display of digital (ATSC) terrestrial broadcast. The reference hardware module is designed to drive a 480i television set either from an external set top converter box or as an internal controller module in an ATSC compliant CRT-based DTV. The reference TV application software complies with the ATSC broadcast standards. The reference TV application supports the basic functions required for a DTV, such as an ATSC/NTSC software stack, Electronic Program Guide (EPG), closed-caption decoding, parental control, basic audio control (i.e. bass, treble, balance), basic video control (i.e. contrast, brightness, color) and remote control.

Product Brief

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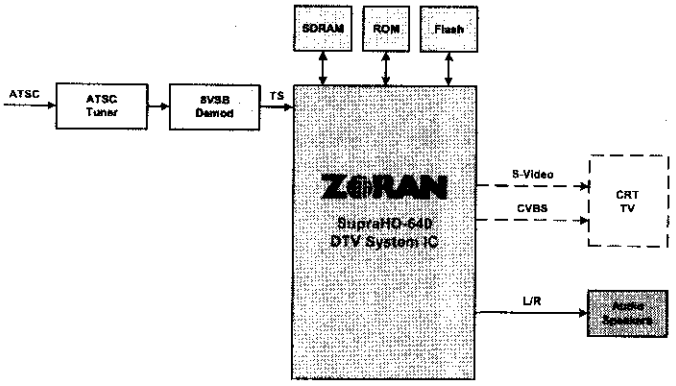
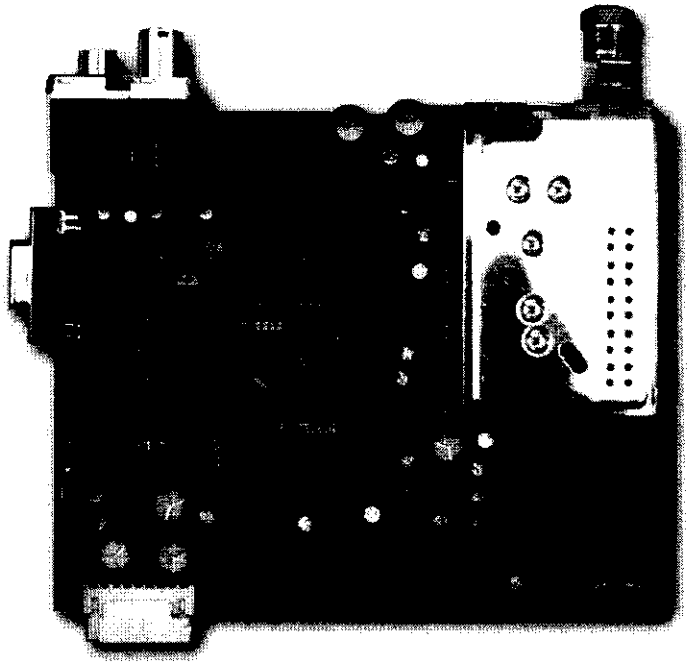
Key Hardware Features

- SupraHD-640 DTV System IC
- Boot ROM: 32KByte on SPI bus
- NOR Flash Memory: 16MByte
- DDR SDRAM: 64MByte
- ATSC/NTSC Tuner
- Oren 8VSB/QAM Demodulator
- Video In: ATSC/NTSC Tuner, CVBS, S-Video, YPbPr, VGA, HDMI, IEEE-1394
- Audio In: Left and Right Channels
- Auxiliary Video Out: Analog YPbPr or RGB (for CRT TV)
- Main Video Out: CVBS and S-Video (for CRT TV)
- Audio Out: Left and Right Channels, SPDIF
- IR Remote, I2C, and RS-232 interfaces

System Block Diagram



SupraHD 640 Board - Current size



SupraHD 640 Board - reduced size (In Development)

For more information, contact Zoran's Sunnyvale office or the office nearest you:

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