



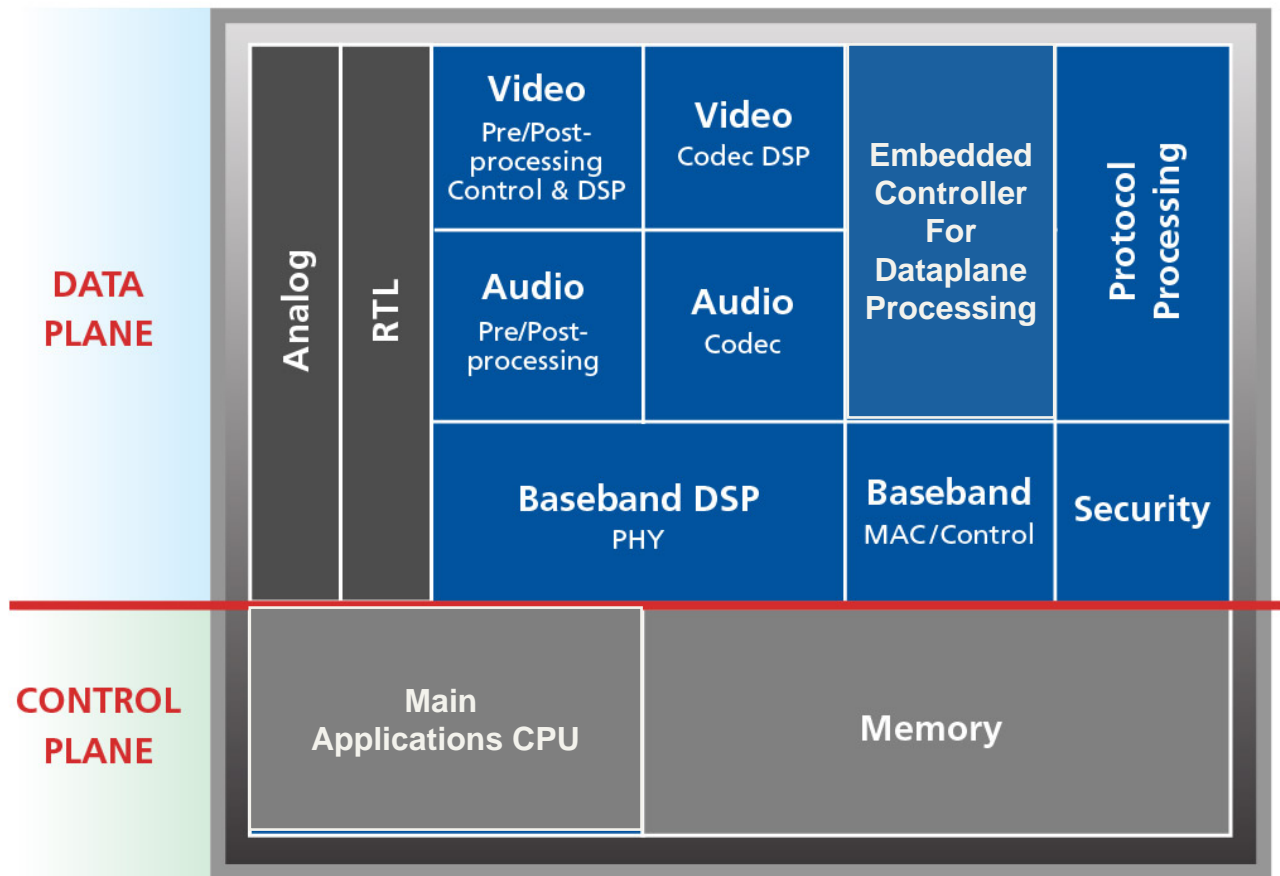
## Tensilica Update and Trends in Digital Radio

**Chris Rowen**  
Founder and Chief Technology Officer

**Globalpress 2009**

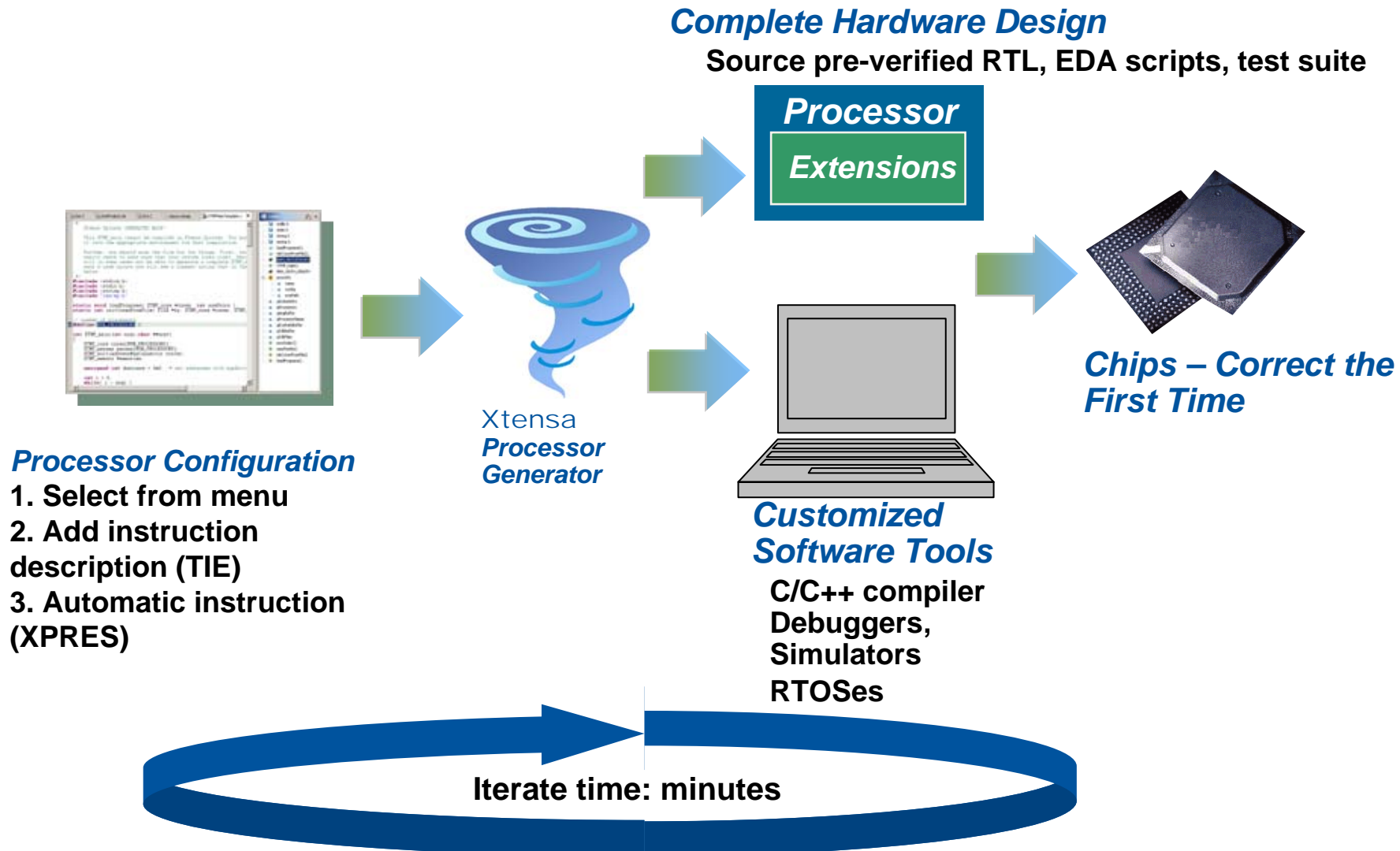
# Focus: Dataplane Processing Units (DPUs)

DPUs: A unique blend of CPU + DSP that deliver programmability and improved power, performance & cost

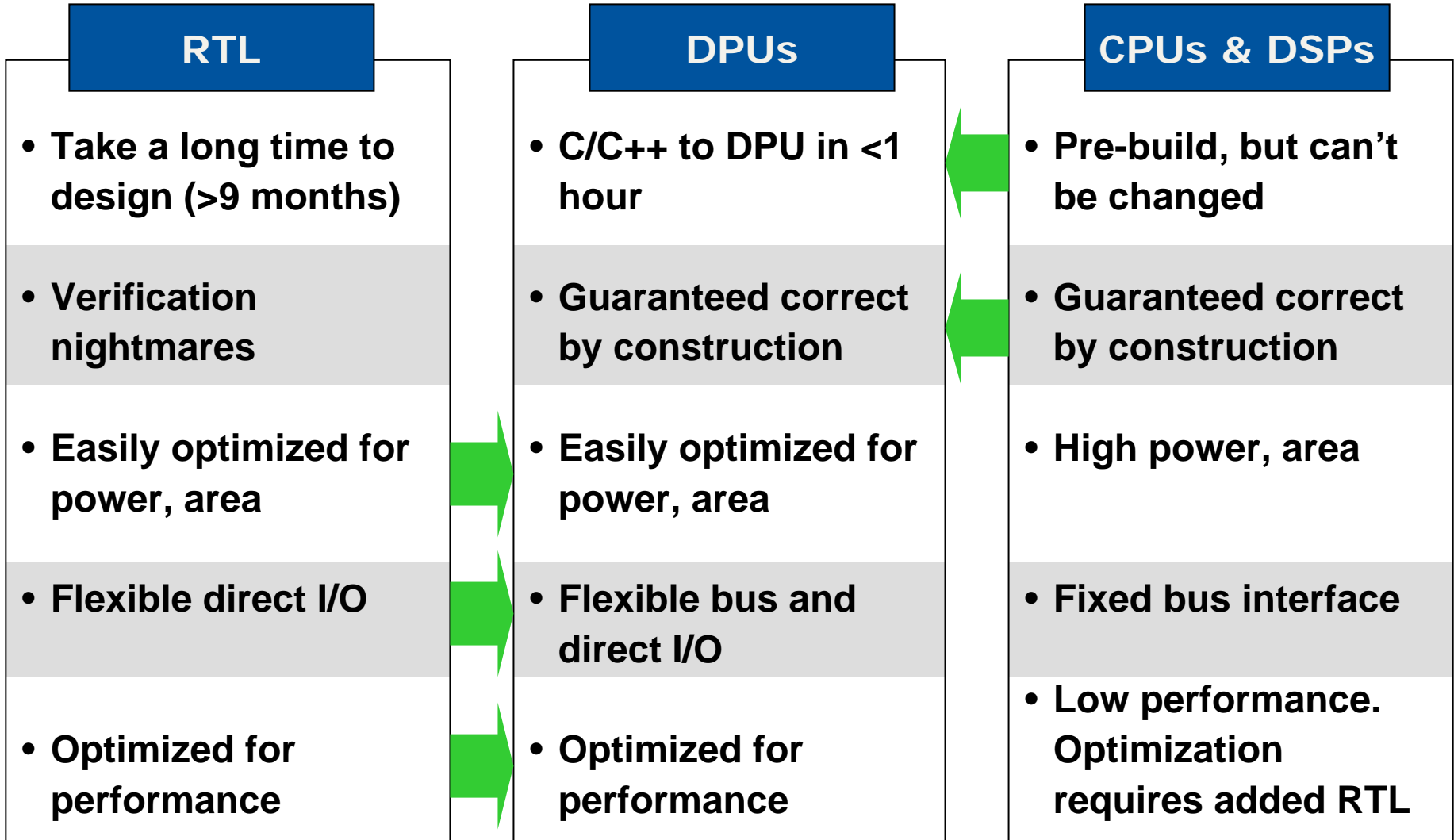


■ Tensilica focus: Dataplane Processors

# Automated Dataplane Processor: Create a Core & Software in Less than 1 Hour



# Optimized DPUs Outperform RTL Blocks and Traditional DSPs and CPUs



# Standard and Custom DPUs Based on a Common Xtensa Processor Platform



	Baseband	HiFi Audio	VDO Video & Imaging	Controller	Other		
Fully customizable Cores	Xtensa DSPs	Xtensa with HiFi audio	Xtensa for Video	Xtensa controllers	Data Comm	Storage	Security
Configurable Cores	Configurable Comms DSP	Configurable HiFi Audio DSPs	Standard VDO 388VDO	Configurable Controllers			
Standard Cores	Standard Comms DSPs 545CK	Standard Audio DSPs 330HiFi		Diamond Controllers 106Micro, 108Mini, 212GP, 232L, 570T			

## Core Xtensa DPU Foundation

Xtensa Automatic Processor Generator (core creation in <1 hour)

Complete Software Toolchain, 3rd Party Ecosystem, EDA Flows, Models

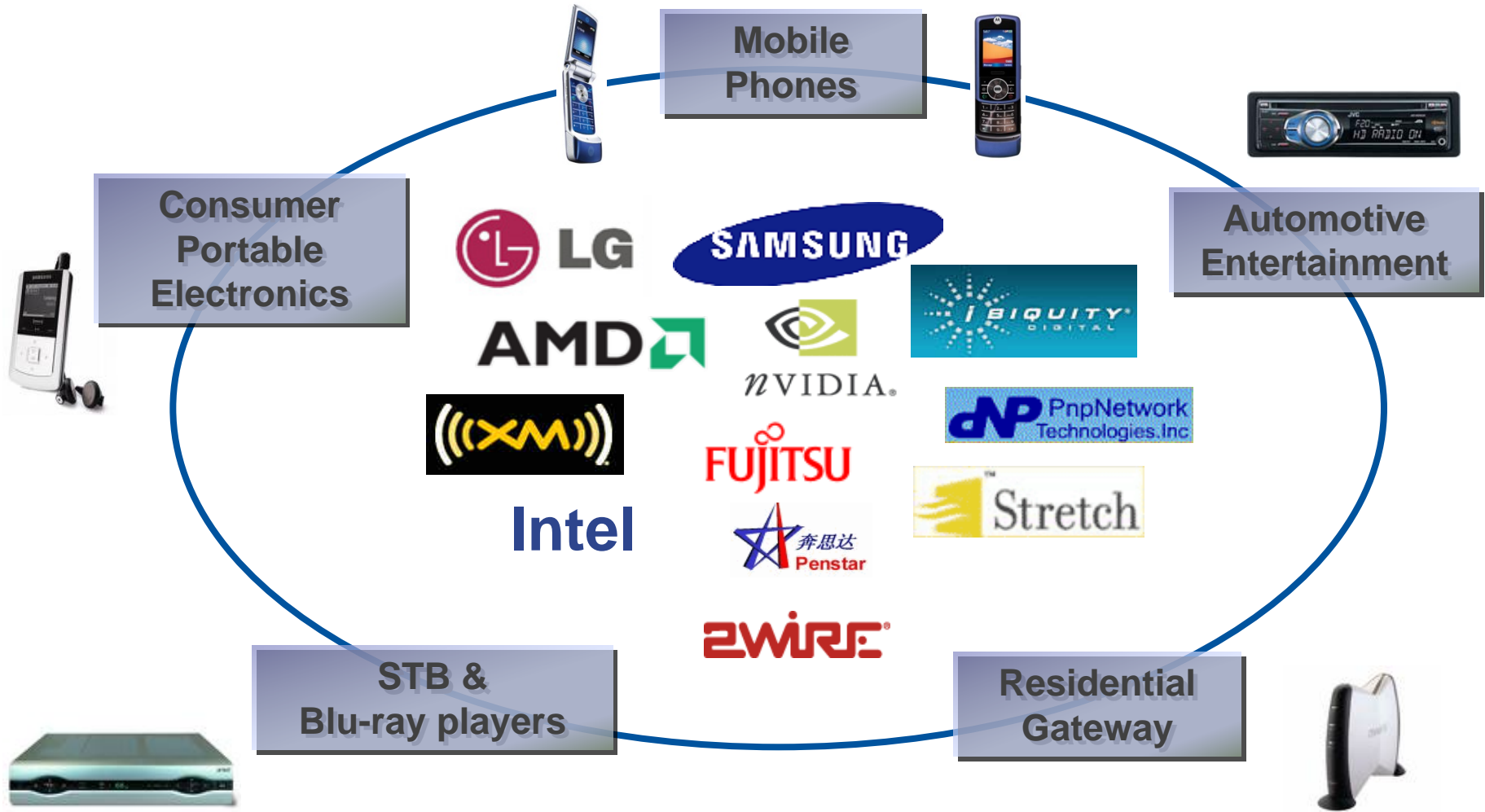
Multiple Processor SOC Design Infrastructure

# HiFi 2 Audio Processors

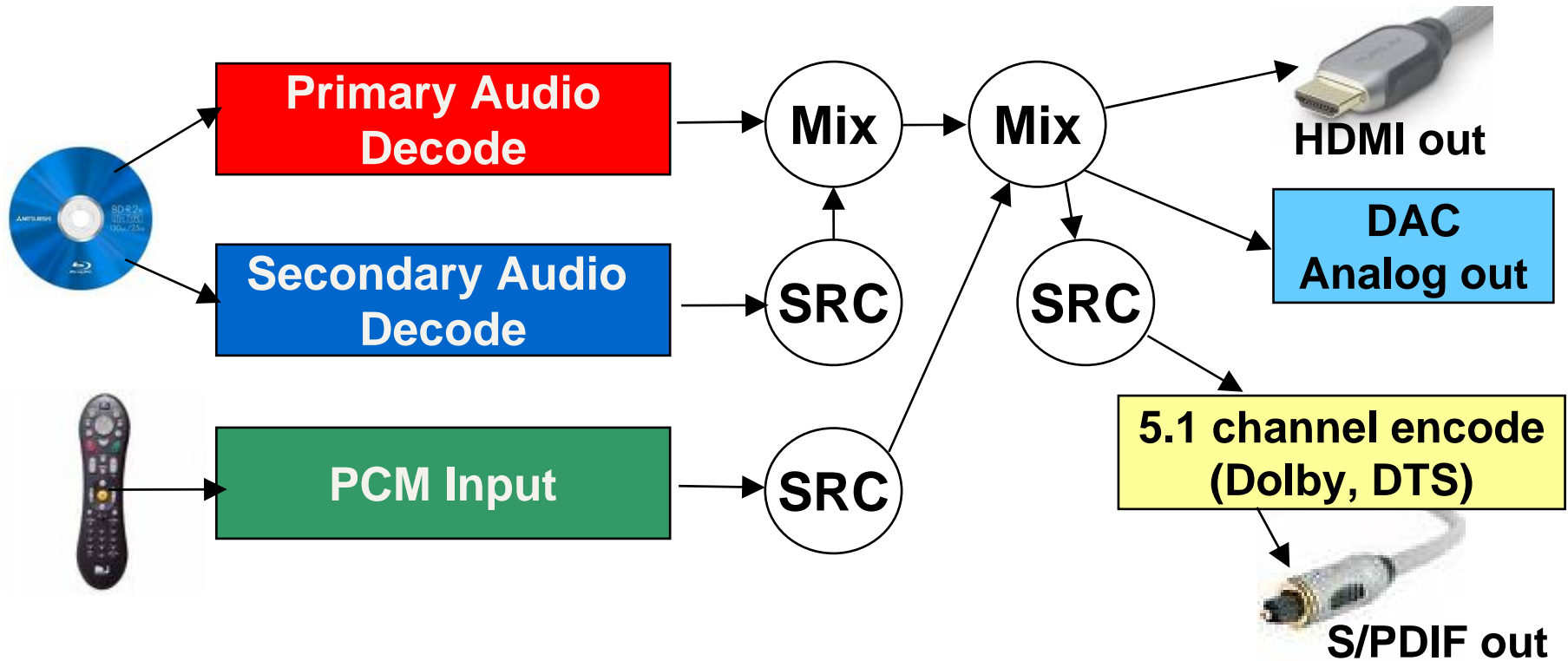
More than 20 Licensees



Used by 5 of the Top 10 Semiconductor Companies



# Only Single-Core Solution for High-End Blu-ray Disc Decoding



**65nm process – Single HiFi audio processor core runs entire Blu-ray Disc Audio Stack – everyone else needs 2 cores**

# Digital Radio – The Next Big Market Move

## Analog Radio



- No data capabilities
- Reflection and multi-path problems hurt sound quality
- Subject to interference from other transmissions
- Comparably inefficient use of spectrum
- Limited number of stations – each taking wider bandwidth
- Stereo or monaural only

## Digital Radio

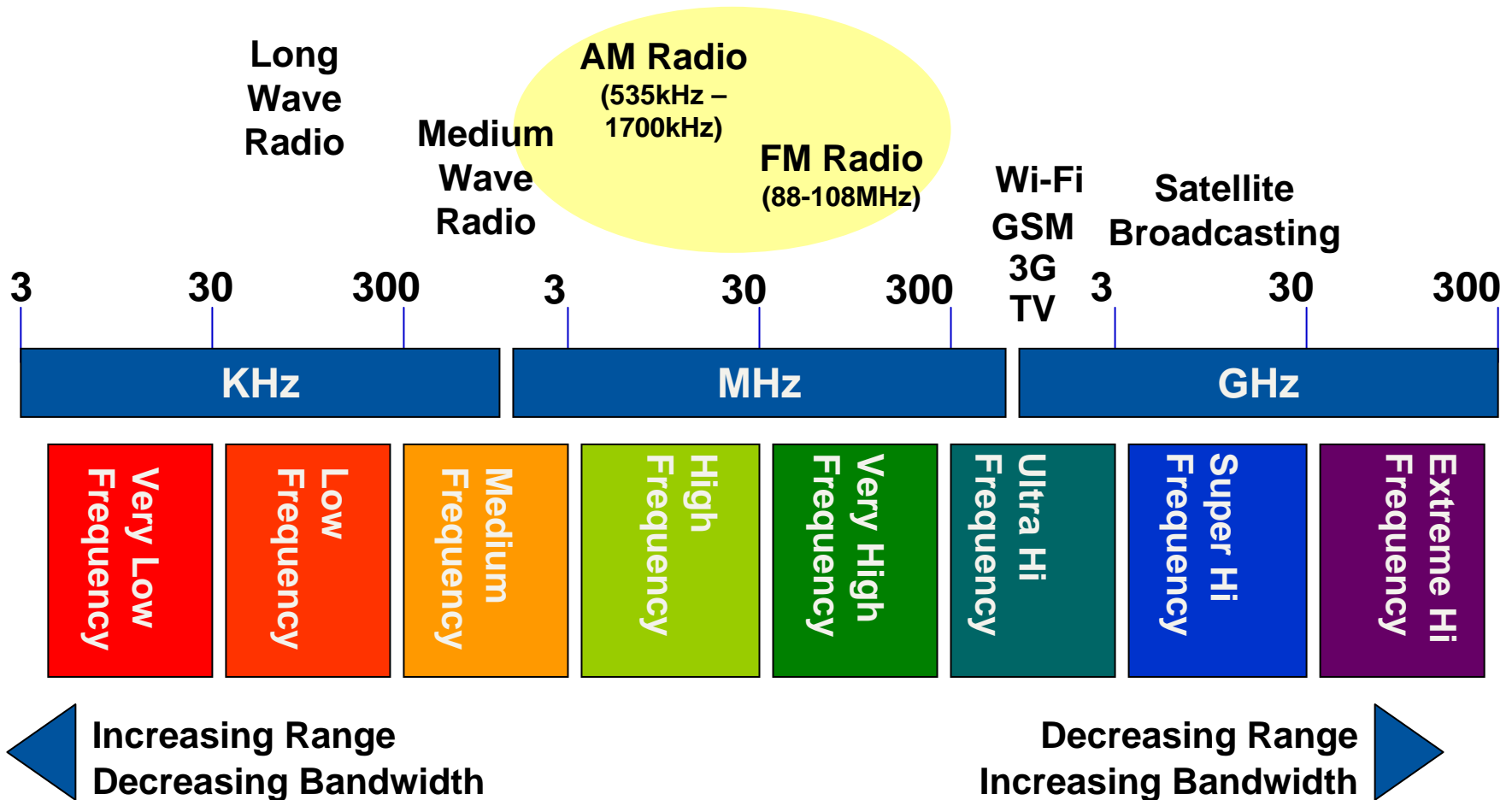


- Datacasting – iTunes song tagging, real-time traffic updates, etc.
- Much better sound quality
- Virtually no interference from other transmissions
- Many more stations in same bandwidth
- Robust at lower transmission powers
- Surround audio

**Worldwide shipments will reach 32.2 million units by 2011 – In-Stat**

# Digital Radio Spectrum

**Challenge: Get More Stations & Better Sound Quality in AM/FM Radio Bands**



# Digital Radio Worldwide

Location	Currently Deployed	In Development
USA	HD (Hybrid Digital) XM-Sirius	
Canada	HD, XM-Sirius, DAB	
Europe	DRM, DAB, DAB+ DMB-Audio	DRM+
Japan	ISDB	HE-AAC
Korea	T-DMB	
Philippines	HD	
China	DAB, DAB+, T-DMB, DRM	DRM+
Taiwan & India		DRM
Australia	DAB+	

# HiFi 2 Digital Radio Support

All Digital Terrestrial and Satellite Radio standards are supported on the HiFi2 Audio DSP



- **HD Radio - Available now from iBiquity Digital**
- **DAB - Available now with the HiFi 2 MP3 decoder**
- **DAB+ - Available now from Tensilica, Certified by Dolby**
- **DRM (Digital Radio Mondiale) - Today's announcement**
- **XM Satellite - Available from XM Satellite**
- **T-DMB (BSAC audio) – Available now**
- **ISDB – Available now with AAC, HE-AAC decoders**

# DRM – the Latest Standard for HiFi 2

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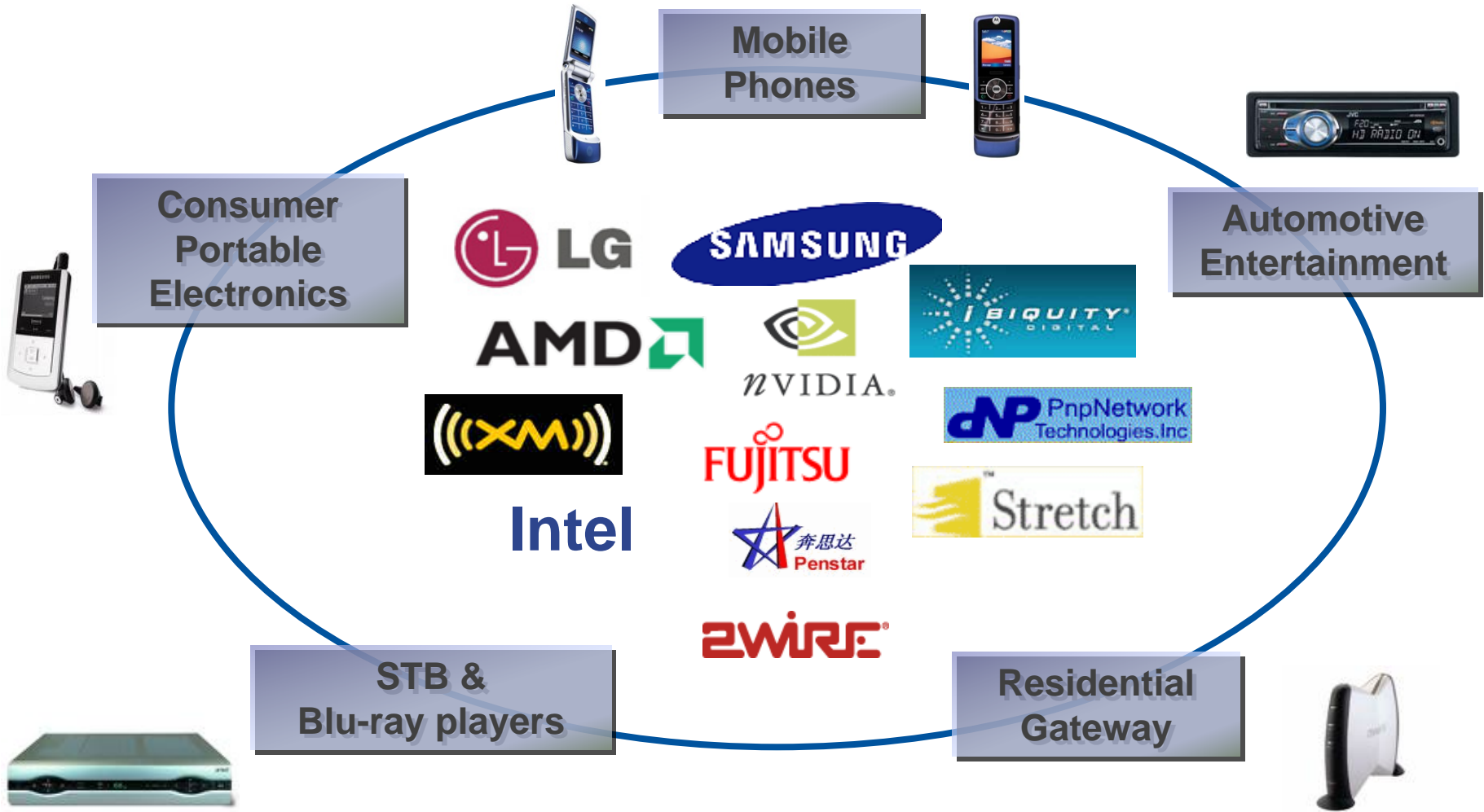
- **Delivers FM-comparable sound quality in AM spectrum**
- **Fits more channels into bandwidth with digital audio compression**
- **Approved by IEC and ITU for most of the world**
  - Approval for the Americas and Pacific is pending
- **Tensilica worked with Dolby on DRM for highest quality**
  - **Dolby is a proven HiFi 2 partner with other codecs:**
    - **Dolby Digital AC-3 decode and encode**
    - **Dolby Digital Plus decode, 5.1- and 7.1-channels**
    - **Dolby Pro Logic II and IIx decode**
    - **Dolby True HD decode**
    - **DAB+**
    - **aacPlus**
    - **BSAC**



# HiFi 2 – The Only Audio Core that Spans from Cell Phones to Home Entertainment



Used by 5 of the Top 10 Semiconductor Companies



# Fastest Growing Processor / DSP IP Company

## Customizable Dataplane Processor/DSP IP Licensing

- Leading provider of automated, customizable Dataplane Processor Units (DPUs): a unique combination of processor & DSP IP cores + software design tools
- Improves power, cost, performance
- Standard DPU solutions for audio, video/imaging & baseband communications
- Dominant patent portfolio for configurable processor technology

## Broad-Based Success

- 140+ Licensees, including 5 of the top 10 semiconductor companies
- Shipping in high volume today (>200M/yr rate)
- Fastest growing Semiconductor Processor IP company:
  - 21% revenue growth in 2007, 25% in 2008

