

# Communication and Networking Riser (CNR)

**Brad Bickford**  
**Manager of Strategic Marketing**  
**Intel DPG/OPSD**

**Brad Barmore**  
**PC Architect**  
**Intel DPG/OPSD**

# Agenda

- Desktop Riser Strategy
- CNR Overview
- CNR and the Retail Market
- CNR Plug and Play
- AC '97 Interface Plug-and-Play
- Call to Action

## Desktop Riser Strategy

# Value and Price Point

- Risers extract value from technologies integrated into the desktop chipset
  - When the technology has a corresponding interface
- Risers provide a price point between integrated on the motherboard and PCI
  - Integrate technology on motherboard when justified by attach rates
  - PCI solutions have cost and pins not contained in riser solutions

Desktop Riser Strategy

# Riser Flexibility

- Risers provide flexibility of shipping more than one vendor on a platform
  - Have a riser solution for each desired vendor
- Risers allow you to separate certification requirements from the motherboard
  - Certify the riser once, use on many platforms
  - Allows TTM opportunities

## CNR Overview

# Flexibility and Advantages

- **CNR provides a flexible, low cost vehicle for implementing communication and networking technology**
  - Utilizing the integrated MAC of desktop chipsets
- **CNR addresses the issues identified in the Audio Modem Riser Specification (AMR)**
  - Sacrificing a PCI slot
  - WHQL support and Plug and Play

**CNR is a low cost, flexible desktop riser**

## CNR Overview

# Solutions

- **CNR helps solve the RJ-11 convergence issue of HomePNA, Modem, and xDSL**
  - Address the end-user confusion of multiple RJ-11s
- **CNR provides the OEM the opportunity to support a commercial or consumer platform using same motherboard**
  - Leverage development teams across different customer segments
  - HomePNA for consumer, 10/100 Ethernet for commercial

# Technology Integration

- **CNR provides a low cost vehicle for integrating new technologies**
  - When attach rates do not justify motherboard integration
  - Utilize USB through the connector
    - wireless solutions
  - Provide 4 or 6-channel soft audio upgrade
    - 2-channel down on motherboard, 2-channel on riser
    - 2-channel down on motherboard, 4-channel on riser

**CNR integrates technology into the desktop platform**

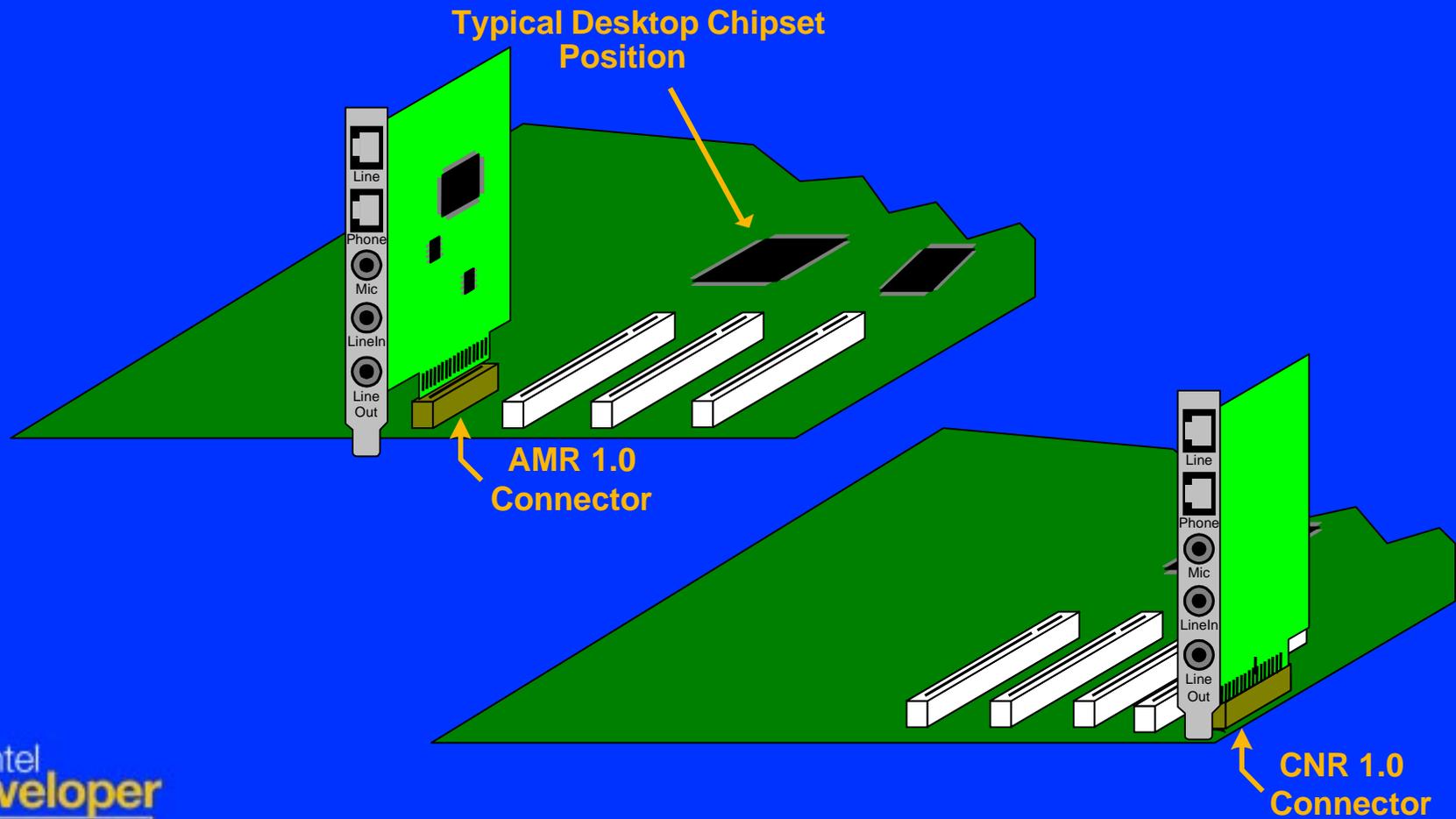
## CNR Overview

# CNR 1.0 Instead of AMR 2.0

- **Sharing a PCI slot prevents CNR from being compatible with AMR**
  - Changing component side prevents AMR & CNR compatibility
- **Additional functionality beyond audio/modem in new riser**
  - Serial EEPROM interface
    - Support for Plug and Play
  - Interface(s) to the integrated MAC of desktop chipsets

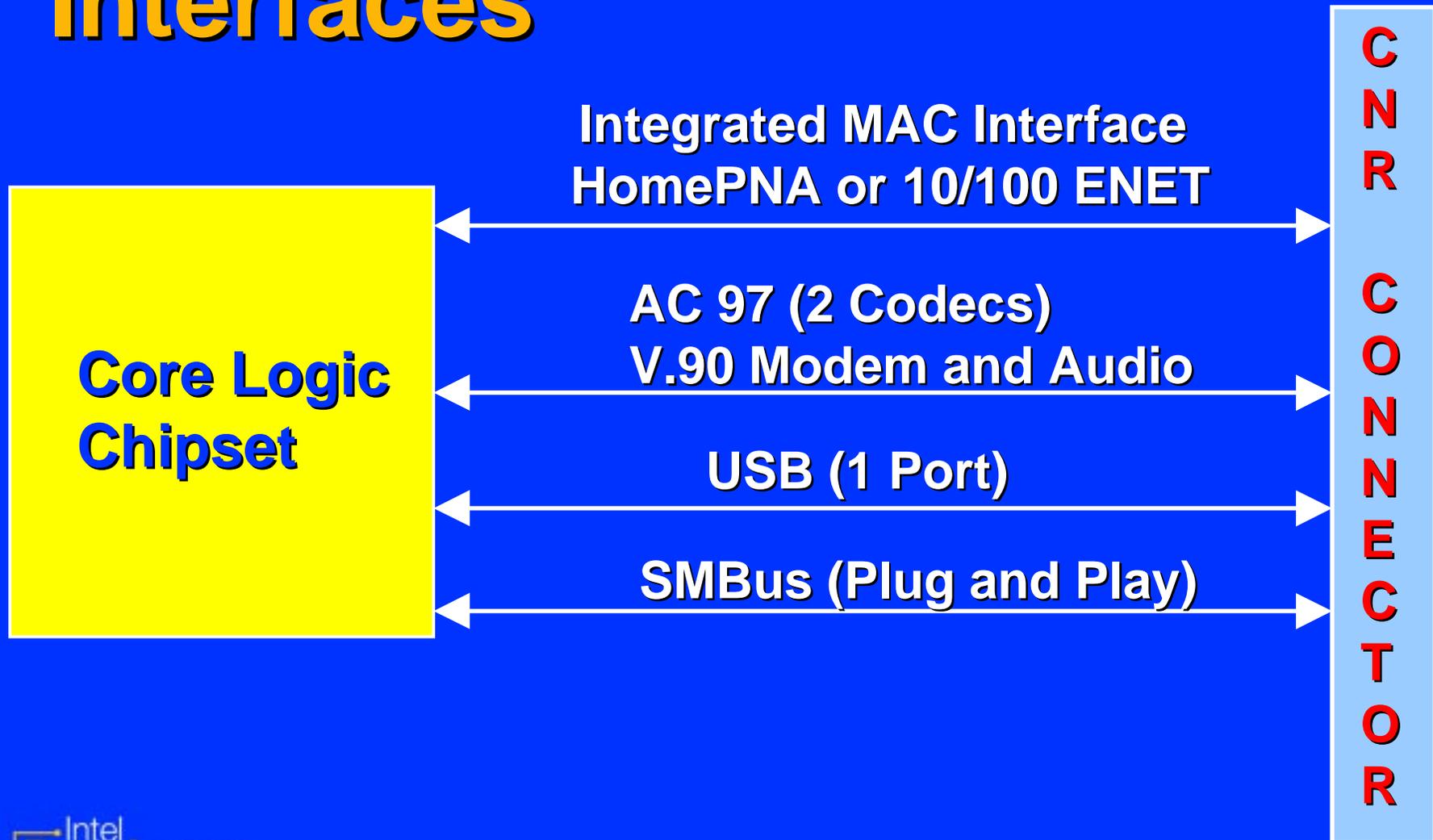
# CNR Overview

## AMR vs CNR Risers



## CNR Overview

# Interfaces



## Risers and the Retail Market

# Issues

- **Support of all interfaces is not required**
  - CNR plugged in Motherboard not supporting all interfaces
- **Two different MAC interfaces supported**
  - Retail user confusion with cross-plugged MAC interfaces

**CNR is not intended for Retail Market**

## CNR Plug-and-Play **Overview**

- **AMR not well accepted due to lack of PnP**
- **Increased expense and time for system logo testing without PnP**
- **PnP support significantly reduces customer support calls**
- **PnP provides a means for CNR to be self-certifying**

CNR Plug-and-Play

# PnP with SMBus EEPROM

- **CNR SMBus address set by motherboard**
- **SMBus EEPROM internal format defined by CNR Specification**
  - Master configuration space
  - Individual sections for each interface
    - Includes SVID and SID for each interface
  - Expandable for future interfaces
- **Contents determined and programmed by CNR manufacturer**

CNR Plug-and-Play

# PnP for LAN Interfaces

- **Microwire\* EEPROM required for LAN interface PnP**
  - Contains Ethernet address
  - Contains PnP SVID and SID
- **SMBus EEPROM also required for LAN Interface PnP**
  - BIOS specific information on LAN Interface
- **Contents provided by LAN supplier**

**Both E<sup>2</sup>PROMs required for LAN PnP**

AC '97 Interface PnP

# Discussion Areas

- PRIMARY\_DN# Definition
- Motherboard Requirements
- BIOS Requirements
- AC '97 Codec Disabling Rules
- AC '97 Codec Demotion Rules
- Multi-Channel Audio Upgrade

AC '97 Interface PnP

# PRIMARY\_DN# Definition

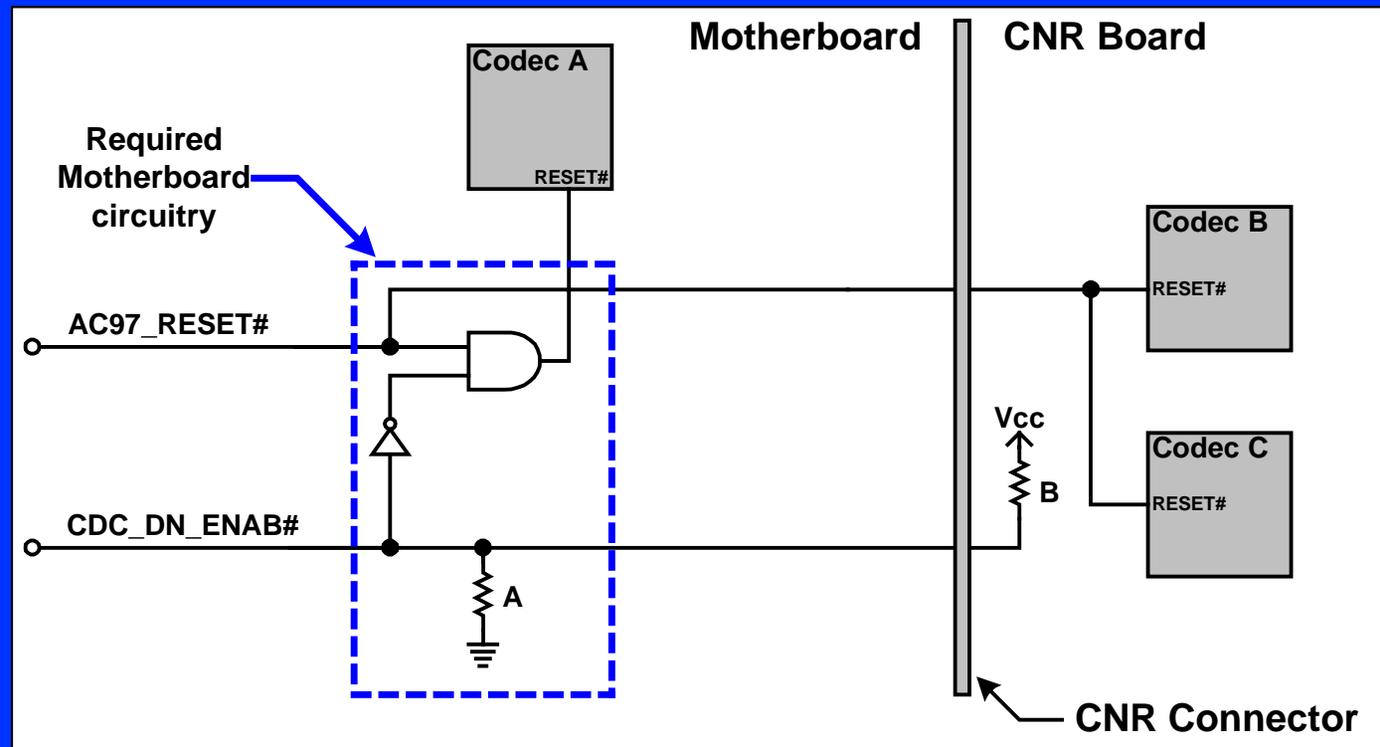
- Redefined/renamed to CDC\_DN\_ENAB#
  - CDC\_DN\_ENAB# is now bi-directional
  - Allows CNR to become master of AC-Link
  - Optional BIOS control of CNR mastering
- Definition comprehends flexibility required by the desktop at a minimum impact to cost
- Solves issues with multiple AC '97 codecs

**Improved flexibility with AC'97 codecs**

AC '97 Interface PnP

# Motherboard Requirements

- Motherboard required to implement disable circuitry for motherboard codec(s)



AC '97 Interface PnP

# BIOS Requirements

- Detect interface mismatches
- Detect illegal codec combinations
- Detect multi-channel audio upgrades
- BIOS required to provide specific messages
  - When interfaces mismatch
  - When illegal codec architecture is detected
  - All other messages optional

**BIOS code required for CNR compliance**

AC '97 Interface PnP

# Codec Disabling Rules

- **Two AC codecs on CNR**
  - Motherboard must disable its codec(s)
- **Two codecs on motherboard**
  - Single codec CNR disables its codec
- **Two MC codecs, then modem disabled**
- **Any combination of MC and AMC**
  - Modem function disabled, audio function enabled

**Follow disabling rules for compliance**

AC '97 Interface PnP

# Codec Demotion Rules

- If **CDC\_DN\_ENAB#** is low
  - CNR codec(s) demote to next address
    - Codec(s) disabled when no address is available
  - CNR codec(s) use next **SDATA\_IN** signal
    - Codec(s) disabled when no **SDATA\_IN** available
- If **CDC\_DN\_ENAB#** is high
  - CNR codec becomes master of the AC '97 interface
  - Motherboard codec(s) disabled

**Follow demotion rules for compliance**

AC '97 Interface PnP

# Audio Channel Upgrades

- **Motherboard and CNR signatures received from codec vendor**
- **BIOS verifies codec manufacturers**
- **BIOS verifies multi-channel audio signatures**
  - **If signatures match, audio function enabled**
  - **If signatures don't match, audio function disabled, and message displayed**

**End-user experience has requirements**

# Call to Action

- Use CNR as your desktop riser strategy
- CNR based motherboards must comply with PnP section of CNR specification
- CNR board designs must include full PnP support

# Collateral

- **Communication and Networking Riser Specification available at:**

**<http://developer.intel.com/technology/cnr>**

- **Specification support:**

**[cnr.support@intel.com](mailto:cnr.support@intel.com)**