

Communication and Networking Riser (CNR)

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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

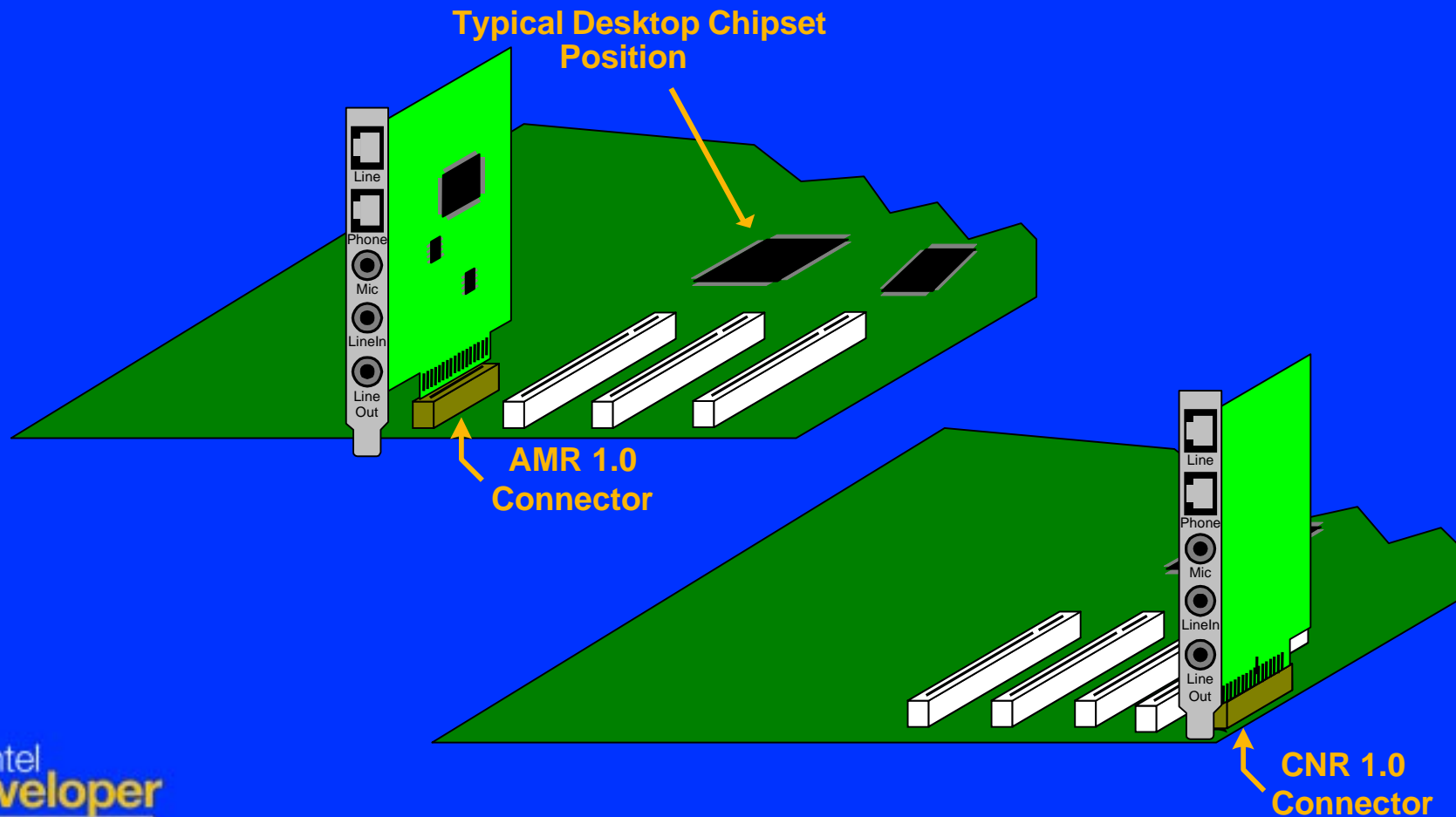
CNR Overview

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

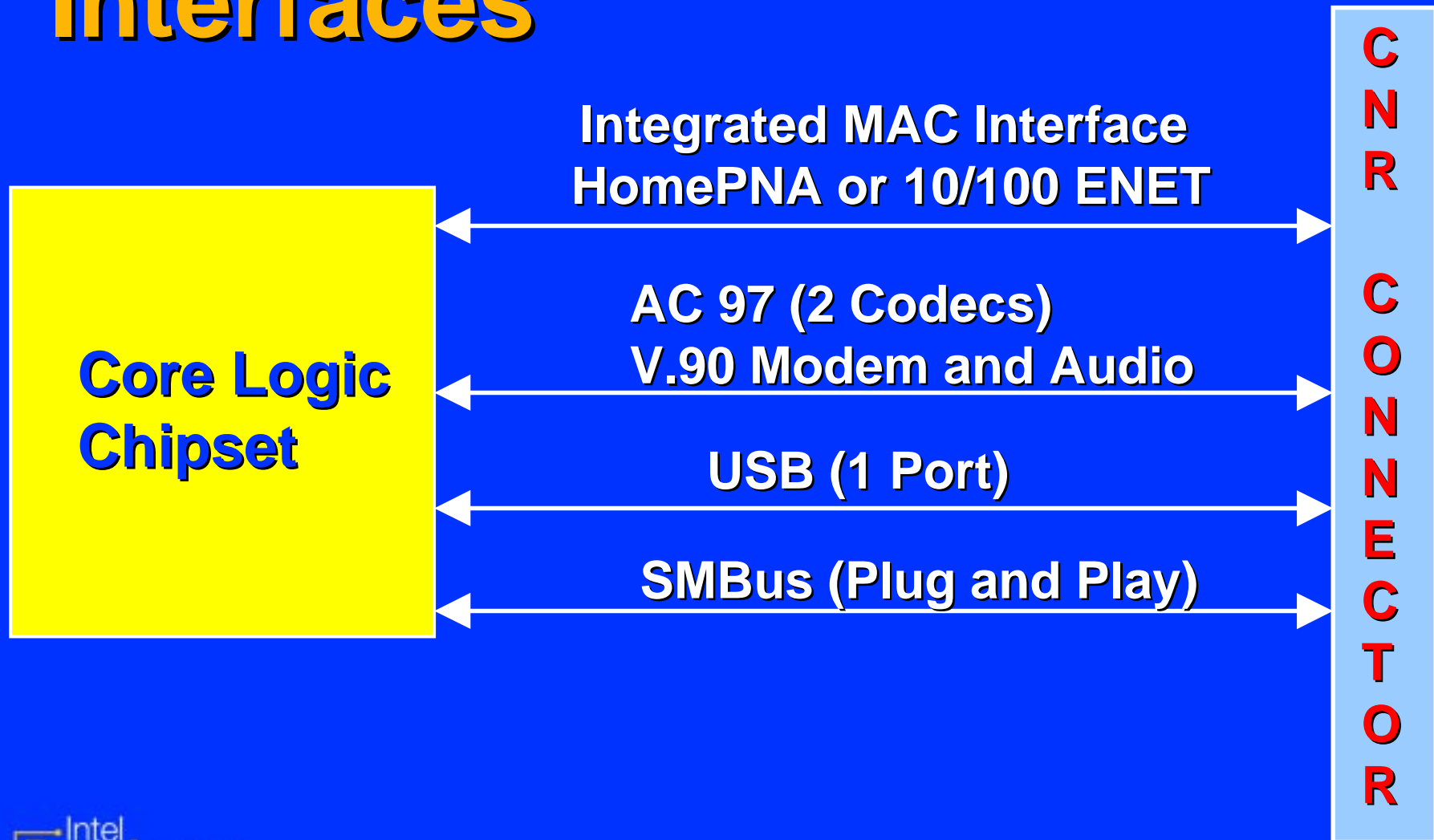
CNR Overview

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 E²PROMs 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

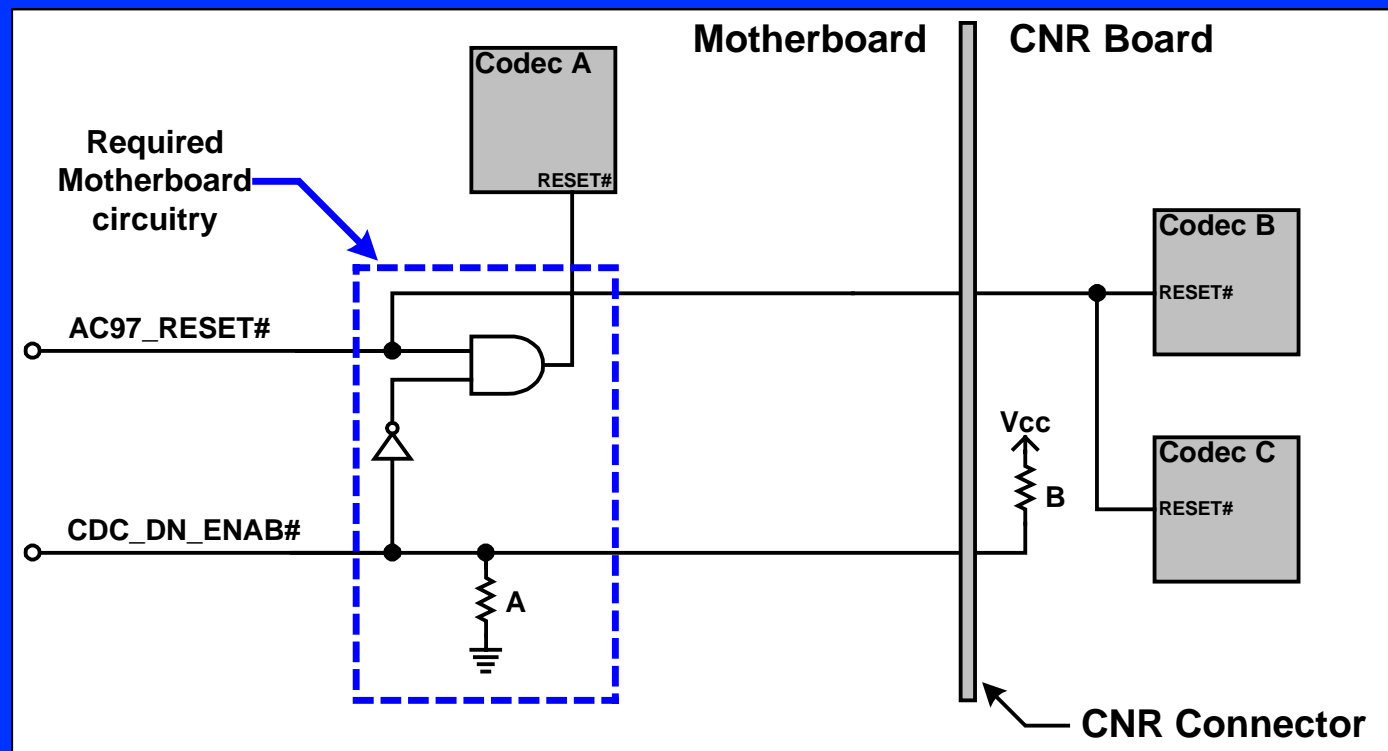
- Redefined/renamed to CDC_DN_ENAB#
 - CDC_DN_ENAB# is now bi-directional
 - Allows CNR to become master of AC-Link
 - Optional BIOS control of CNR mastering
- Definition comprehends flexibility required by the desktop at a minimum impact to cost
- Solves issues with multiple AC '97 codecs

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 disables 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