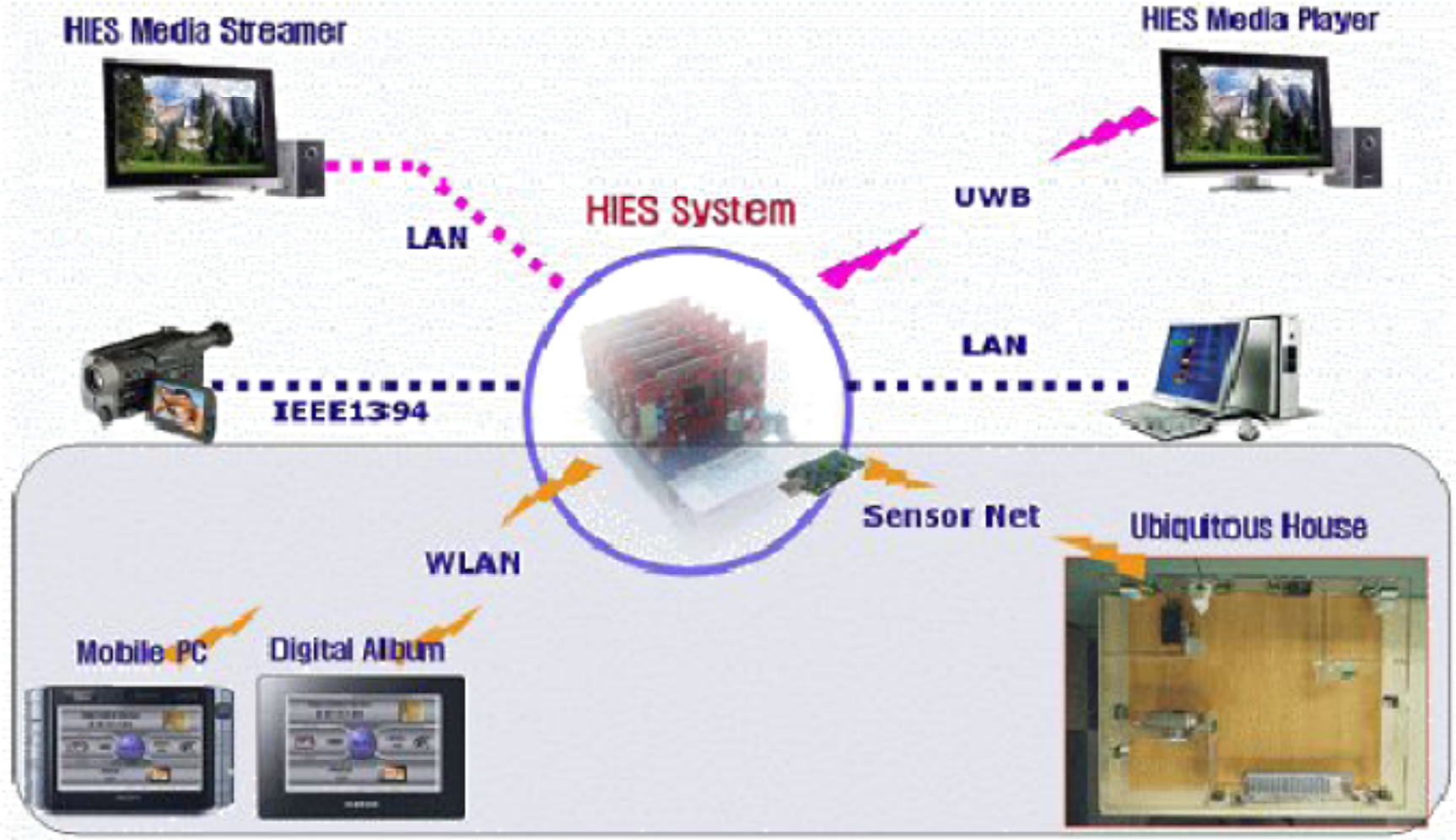
UNC CHARLOTTE

HIES (High-performance Interconnection Extendable Subsystem)

Presented by Liu Hu

What is HIES?

- A sensor network-based home control system supporting the next generation home gateway system
- A high speed switching-based home gateway system


HIES Media Streamer
HIES Media Player
LAN
HIES System
UWB
IEEE1394
LAN
Sensor Net
Ubiquitous House
WLAN
Mobile PC
Digital Album

Requirements of the system

- Universal networking platform based on open architecture
- A communication platform for an open architecture supporting many-to-many communications
- Multimedia data switching architecture
- QoS architecture based on next-generation services
- Common connectivity standardization

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Hardware Specifications

- 6 Ports Serial Switched Fabric Back Plane Board
- Gigabit/Fast Ethernet Interface Card
- UWB Interface Card
- ZigBee (Wireless Sensor Network) Interface Card
- PLC (Lonworks/LnCP) Interface Card
- IEEE1394 Interface Card
- HISS Interface Card

Switching Fabric Specifications

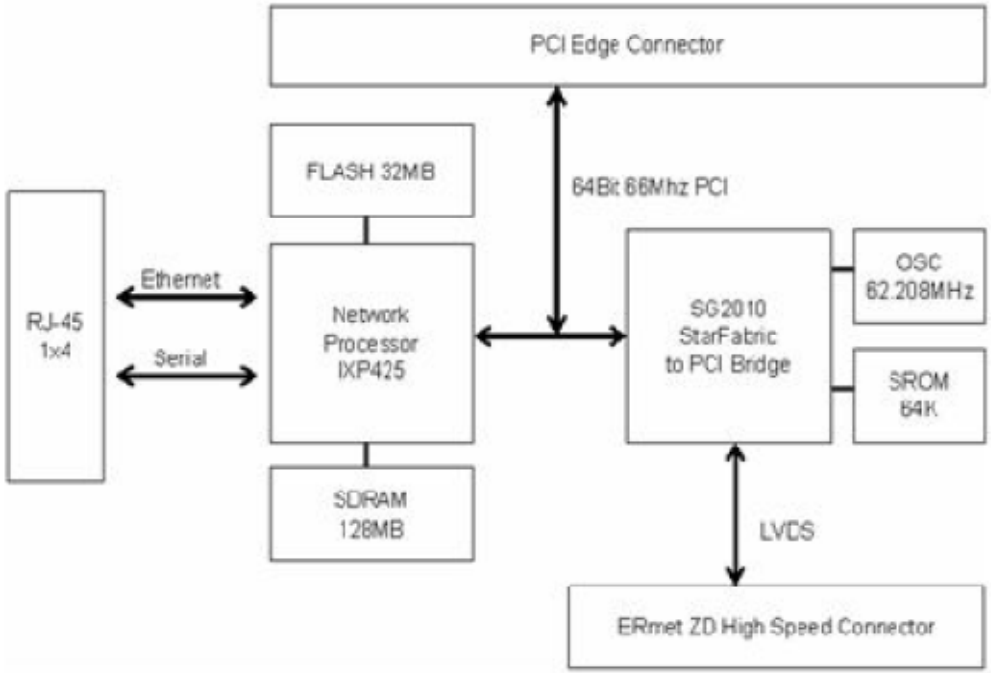
- 2.5 Gbps full duplex line speeds
- 30 Gbps non-blocking switching capacity
- Credit based flow control: credits for next turn and for each class-of-service
- Dynamic bandwidth reservation protocol
- Link-by-Link CRC and 8b/10b checking on all traffic
- Hardware based fault detection and isolation
- Four classes of service
- Physical layer interface: IEEE 1596.3 and TIA/EIA-644 and Low-Voltage Differential Signaling (LVDS) standards

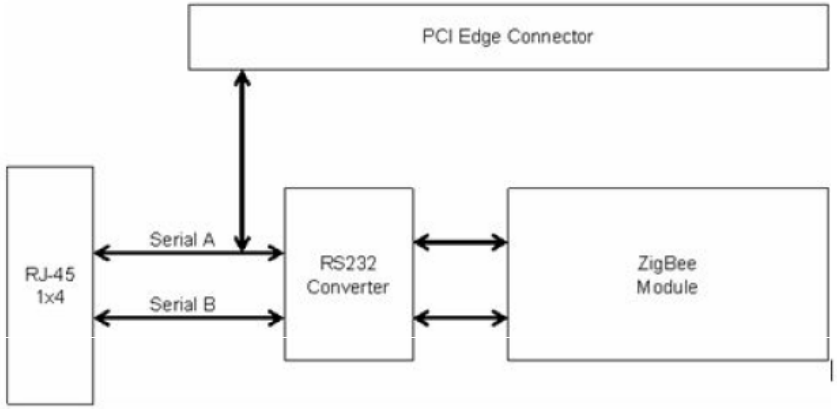
System consists of the following sub-modules

- Sensor network-based ANIC (Area Network Interface Card) module composed of a HIES ANIC Bridge Board and a HIES ANIC Sensor Interface Board
- HIES GUI module as a home control mechanism in a ubiquitous home
- WLAN-based HIES ANIC module for command data processing transmitted to a wireless network in a ubiquitous home

Sensor network-based ANIC module

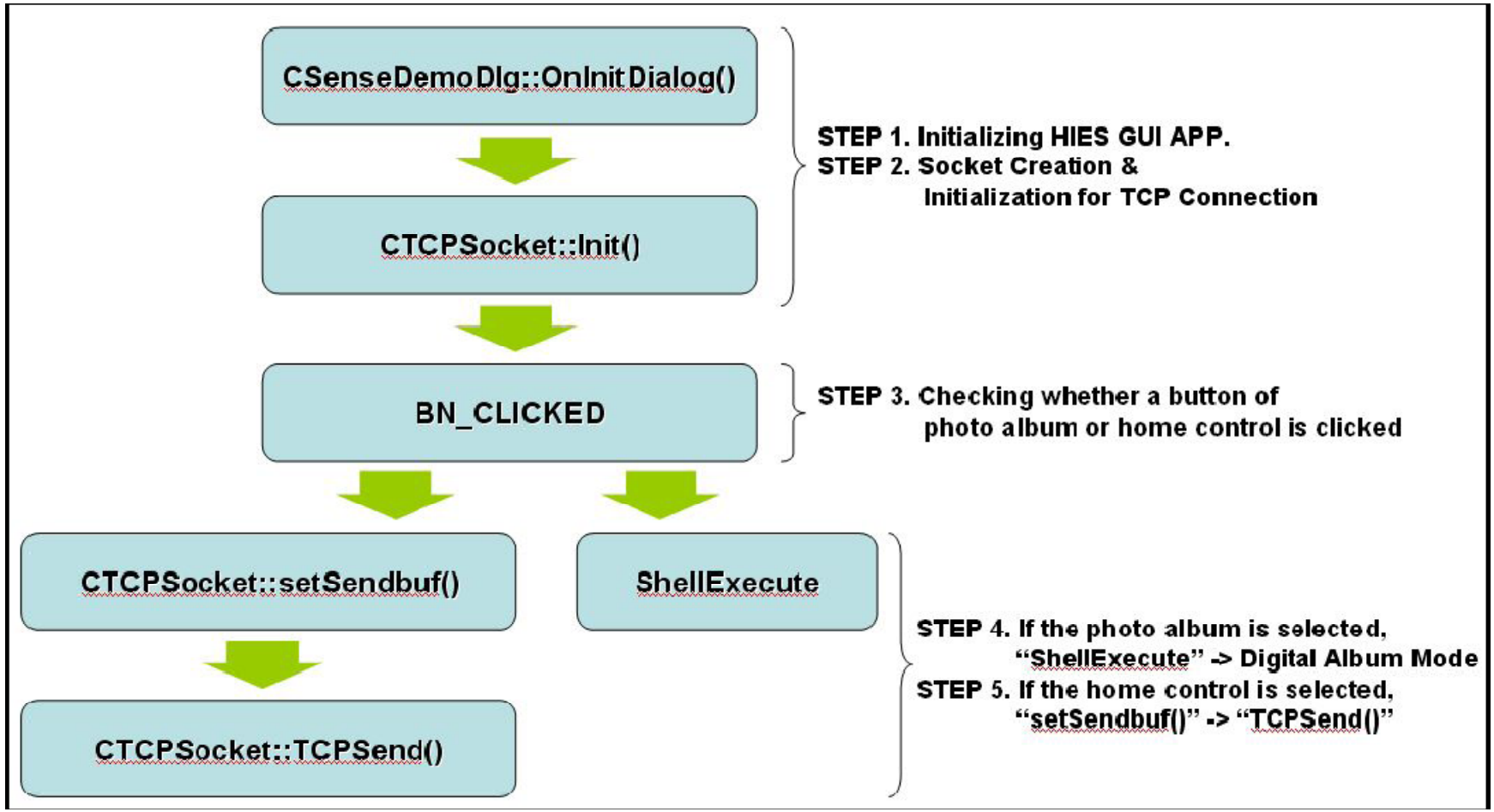
HIES ANIC Bridge Board



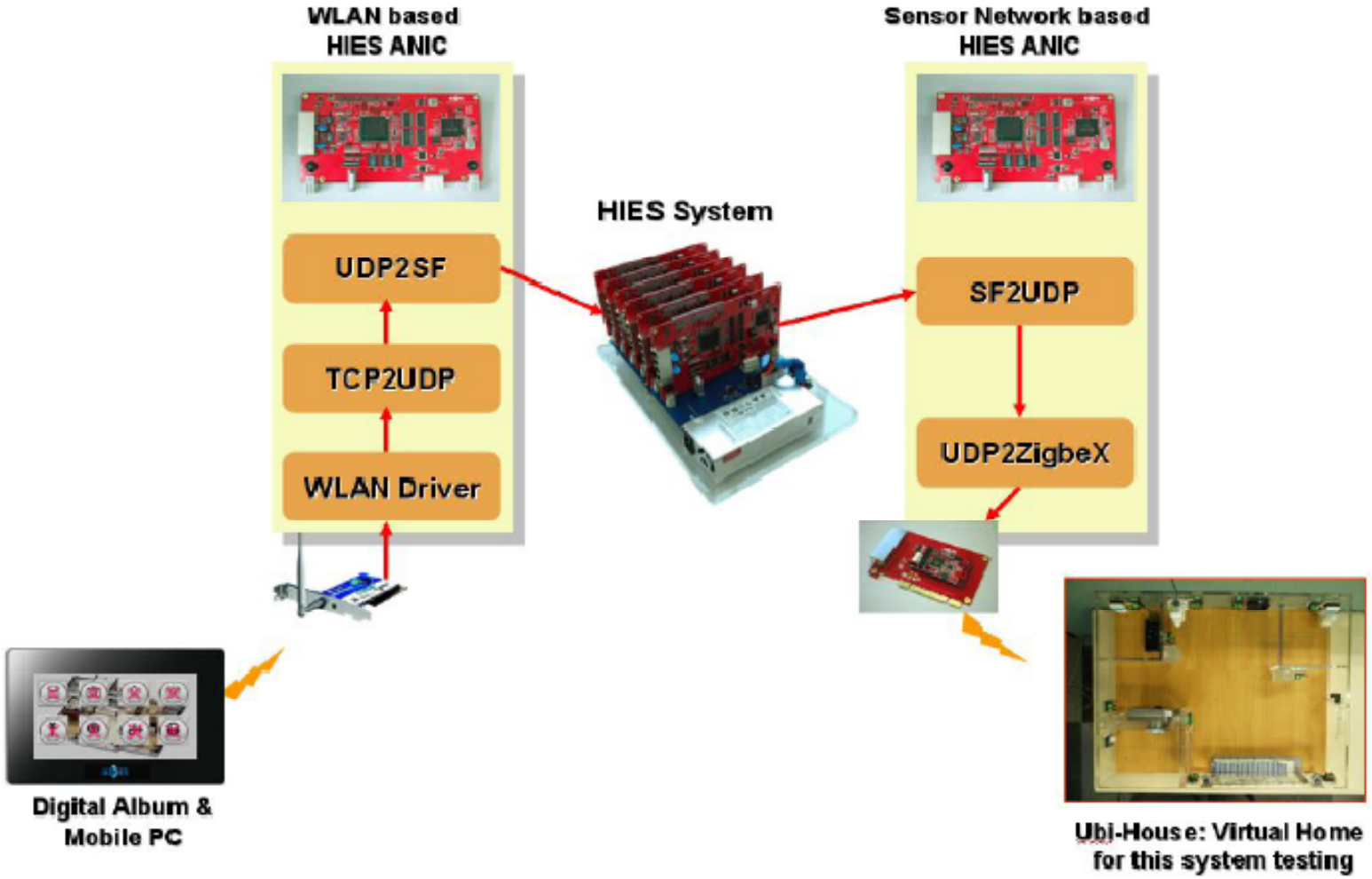


HIES ANIC Sensor Interface Board

HIES GUI:


CSenseDemoDlg::OnInitDialog()
CTCPSocket::Init()
BN_CLICKED
CTCPSocket::setSendbuf()
ShellExecute
CTCPSocket::TCPSend()
STEP 1. Initializing HIES GUI APP.
STEP 2. Socket Creation &
Initialization for TCP Connection
STEP 3. Checking whether a button of
photo album or home control is clicked
STEP 4. If the photo album is selected,
"ShellExecute" -> Digital Album Mode
STEP 5. If the home control is selected,
"setSendbuf()" -> "TCPSend()"

Sensor Network-based Home Control System



UDP2ZigbeeX: Control Message Transmission Procedure for Appliance Control

STEP 1. UDP Socket Creation & Binding

STEP 2. int_serial: Initialization of a serial port

Loop :

STEP 3. Comparing the received UDP payloads

STEP 4. Selecting the ZigbeeX Command

STEP 5. Data Transmission to Serial Port:
write_to_serial()

STEP 6. Message writing: parameter
"TOS_MsgPtr pmsg", "unit8_t length"