

PHYBIT

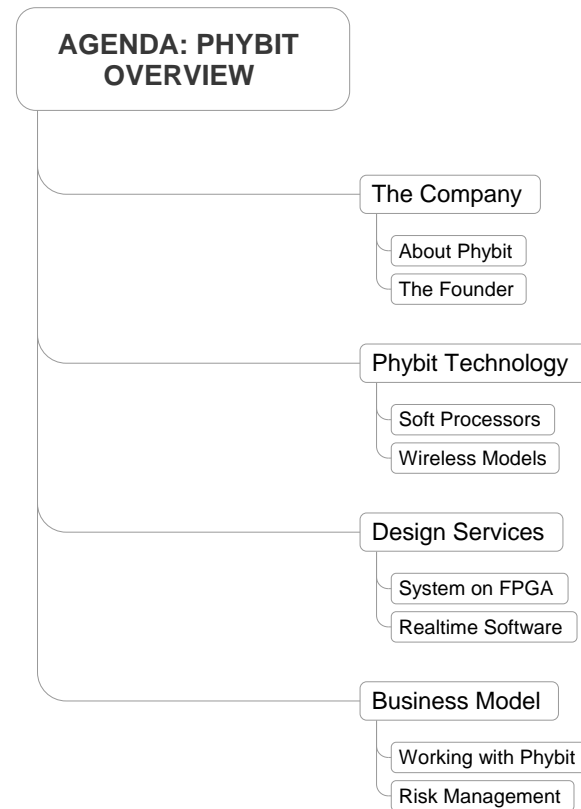
Wireless Technology Crafthouse

1/12/2009



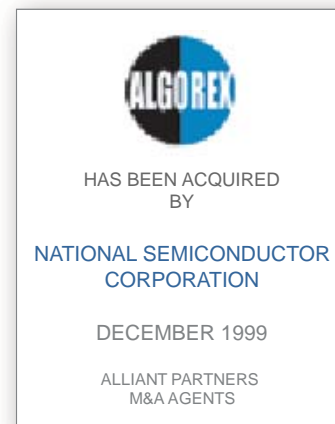
## About Phybit

- Founded by Kambiz Homayounfar
  - Dr. Kenji Kohiyama, Board Member
  - Dr. Masahiro Umehira, Advisor
- A Wireless Technology Crafthouse
  - 15 people headcount
  - 10 inventions (Patent-Pending)
- Provides Design Services
  - System on FPGA
  - Realtime Software
- Established in 2003
- Two locations
  - Tokyo: Sales and Marketing
  - Singapore: Design Center
- Privately -Held
  - ¥ 200 million Investment
  - Self-Financed

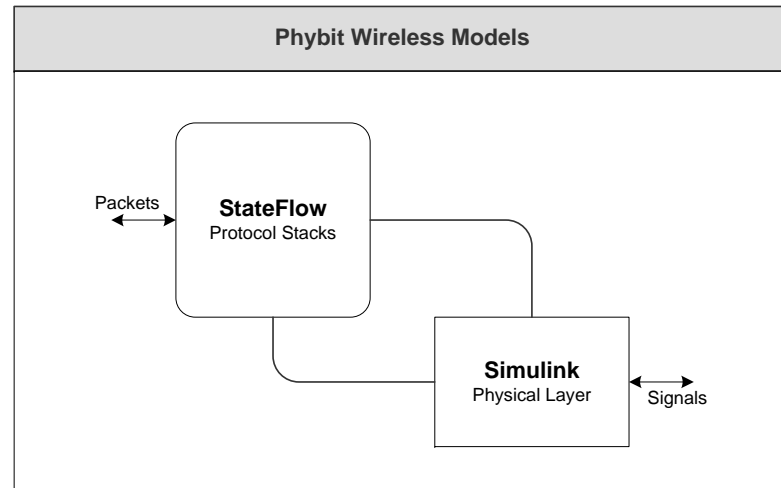
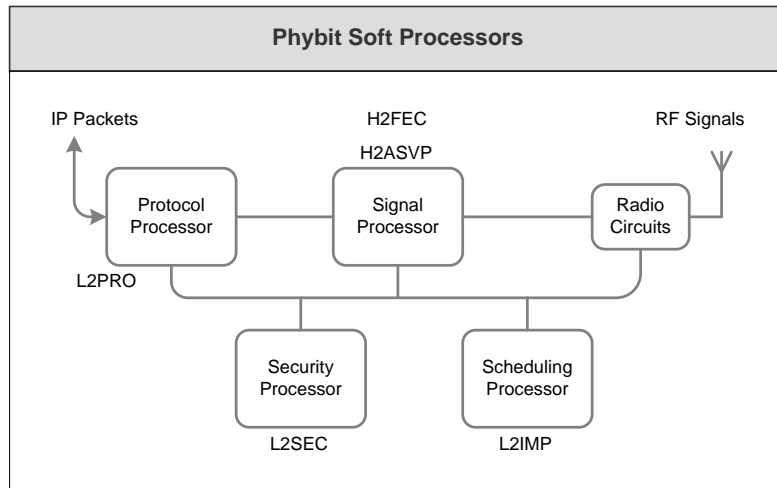


## About Phybit Founder

- 25 Years in Wireless
  - As an Engineer and Entrepreneur
  - Focus on Software and Chips
- As an engineer:
  - Designed Chips
  - Developed Software
  - Built Prototypes
  - Delivered Systems
  - Provided Inventions and Patents
- As an entrepreneur:
  - Built unique technology companies
- Served clients worldwide
  - Alcatel-Lucent
  - Canon
  - Korea Telecom
  - Microsoft
  - NTT DoCoMo
  - Toyota ITC



# Phybit Technology

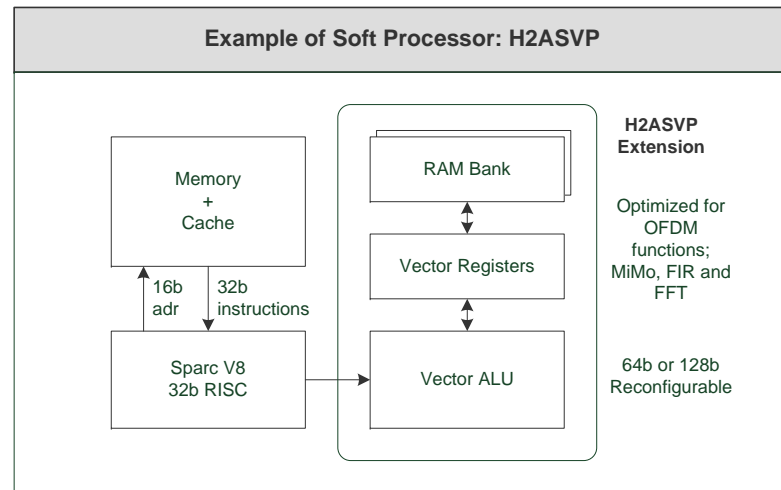
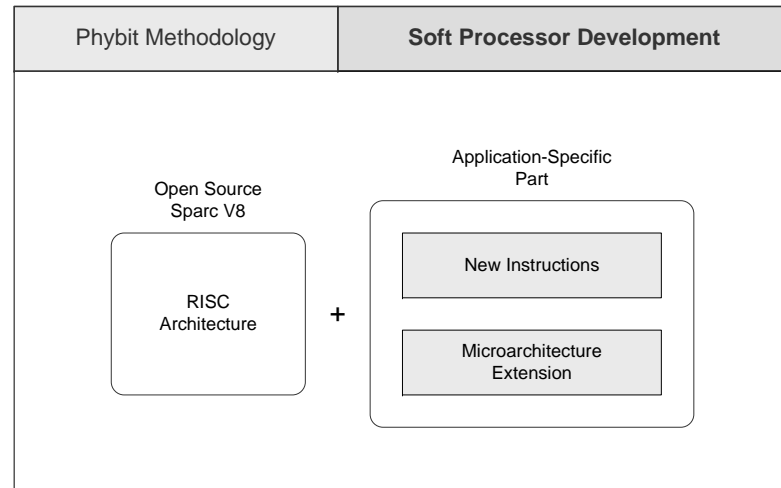


- **Features**
  - Wireless-Specific Instruction Sets
  - Synthesizable VHDL or Netlist
  - C Programmable
- **Benefits**
  - Make FPGA Easy to Use
  - Turn FPGA into Realtime Processors
    - Provide Massive Computing Power
  - Enable Multicore on FPGA Development

- **Features**
  - Large library of Executable Models
  - All Major Wireless Standards
  - Fixed-Point Modules
- **Benefits**
  - Quicker System Implementation
  - Enable Faster Time to Market
  - Test Vector Generation

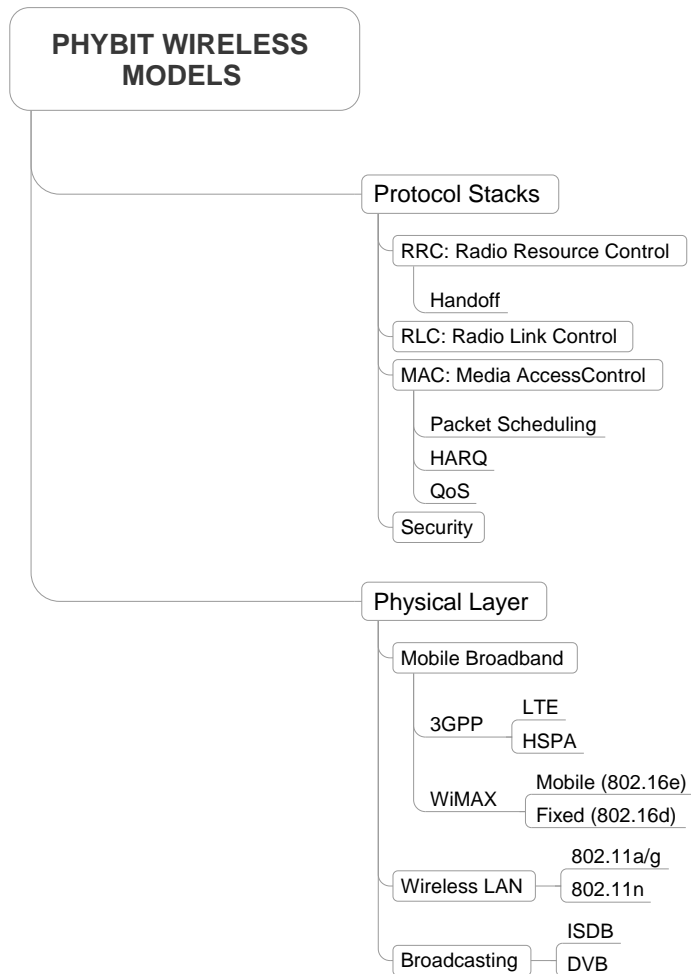
# Phybit Technology: Soft Processors

- Use Open Source Processors
  - Sparc V8
- Instruction Set Extensions
  - Optimized for Wireless
- Microarchitecture Extensions
  - Support Hard Realtime Algorithms
- Available as two families
- H2 Vector Processors
  - H2ASVP
    - OFDM Processor
  - H2FEC
    - Channel Decoder
- L2 Protocol Processors
  - L2PRO
    - MAC/RLC Processor
  - L2SEC
    - Security Processor
  - L2IMP
    - Idle Mode Processor

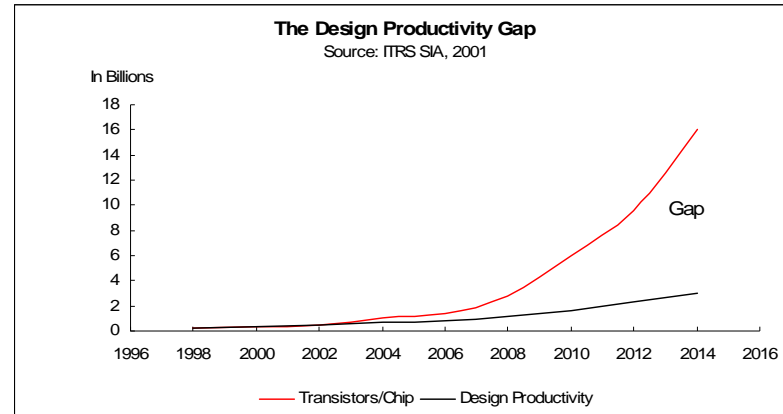
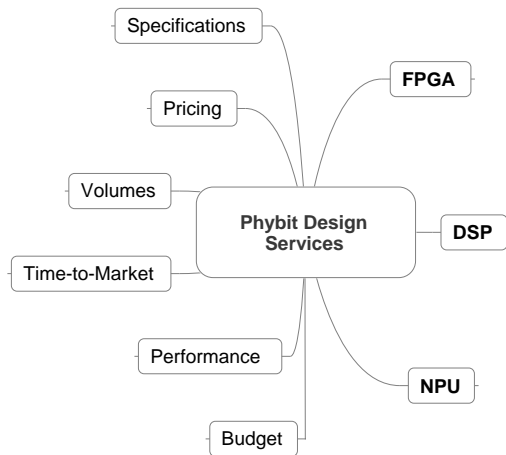


# Phybit Technology: Wireless Models

- Simulink Models
  - For Physical Layer
- Simulink + StateFlow Models
  - For Cross-Layer Protocols
  - Integrate PHY/MAC/RLC/RRC
- Useful for Wireless Workloads
  - Determine realtime resources
  - Worst-Case Execution Time
  - Memory Size
  - I/O and bottlenecks
- Large set of standard models
  - LTE, WiMAX, 802.11n
  - Digital Broadcasting
- New models under development
  - LTE-Advanced
  - WiMAX 802.16m
  - IEEE 802.11 VHT



# Phybit Design Services



- Our focus is on Wireless System Implementation
  - We do nothing else
- Our goal is to reduce the Design Productivity Gap
  - We use our technology to accelerate development projects
  - We do so by re-use of software and processors
- The result is faster Time-To-Market

# Phybit Design Services: System on FPGA

## Examples of Design Capability

- Multiple Antenna Detectors
- Turbo/LDPC Channel Coding
- Power Amplifier Linearization

## • System on FPGA Methodology

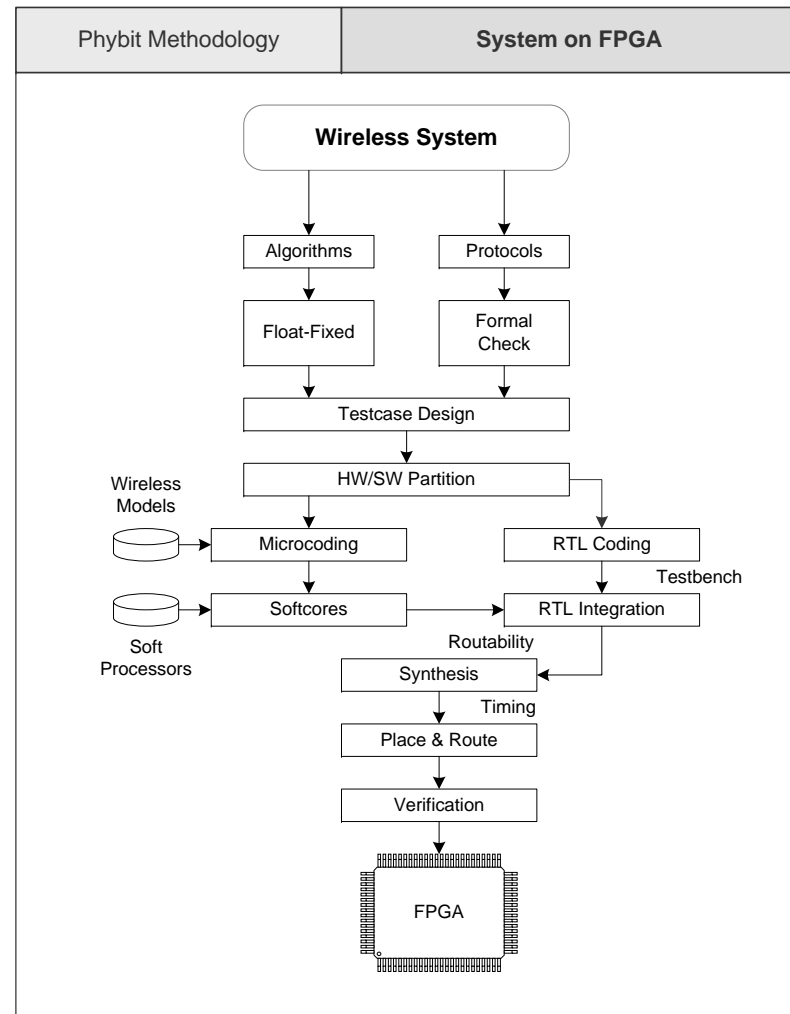
## • Industrial-Strength

## • Features

- Efficient Float-to-Fixed Conversion
- Formal Design Checks
  - Algebraic Specification Approach
- Software-Defined:
  - Re-use of Wireless Models
  - Re-use of Soft Processors

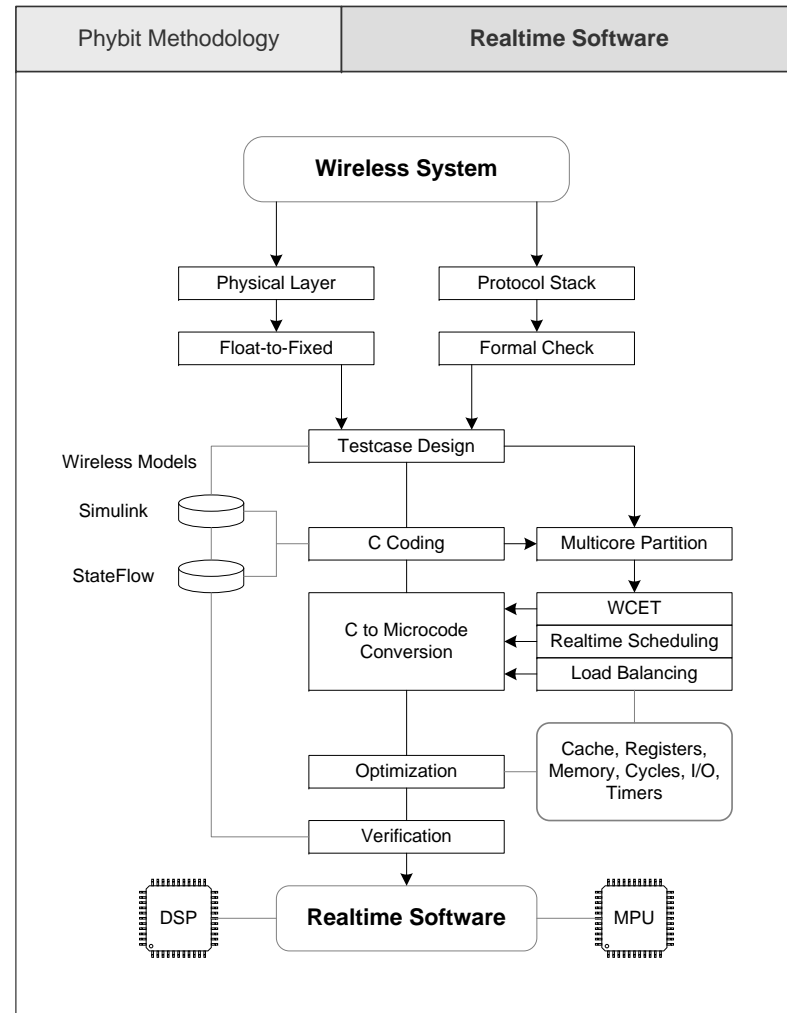
## • Benefits

- Lower Development Costs
- Easy to Use and Upgrade

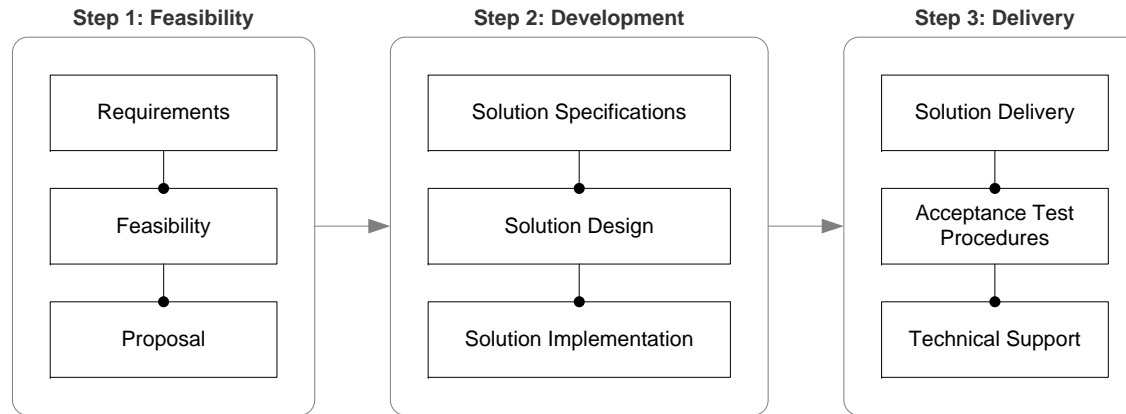


# Phybit Design Services: Realtime Software

- Realtime Software Capability:
  - Multicore DSP (Freescale 8144)
  - Freescale PowerPC and PowerQUICC
  - TI Multicore DSP
  - Intel Xscale and Network Processors
- Features
  - Re-use of Wireless Models
- Benefits
  - Shorter Development Schedules
  - Industrial-Strength Software



# Phybit Business Model



- Typically in Three Phases
  - Step-by-step Approach
  - Incremental Development
- Each Phase has subphases
  - To manage risks
- Phybit Cost Models:
  - Non-Recurring Engineering (NRE) Fees
  - Software License Fees