

**X2E**

EMBEDDED SYSTEM  
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# New Strategies and Concepts in Automotive Embedded System Development

## PART I

**Competence Exchange Symposium 2005**

**Ludwigsburg, 14<sup>th</sup> July 2005**

Dr. Karlheinz Weiß

X2E GmbH



- Future requirements in automotive embedded system design
- FPGA versus ASIC development
- FPGA based Standard Core
- Rapid Prototyping: SPYDER-Generation III Plattform
  - Application example: Complex Gateway
- Future cost reduction strategy
- Conclusion
- Outlook

# Future requirements in embedded system development



- Electronics - the „added value“ of the car
- Development cycles must be reduced
- System integration will become the main challenge for the OEM
  - Demands more time and effort before start of production
- Costs must be reduced
- Development risks and time must be reduced
- What is required in the future? New Strategies and Concepts, based on
  - New technologies: Programmable Logic (e.g.: SoC FPGAs)
  - High level design re-use
  - Rapid prototyping methods
  - Powerful tool support

# FPGA contra ASIC development



## ■ System on Chip Field Programmable Gate Arrays (SoC-FPGA)

### ■ Advantages

- Fast time to Market
- Shorter Design Cycles
- Hardware Updates Possible
- Low NRE costs
- Less design risks
- Easier IP re-use
- „Early hardware availability“

### ■ Disadvantages

- Additional effort and time for configuration
- Higher cost per gate

## ■ Application Specific Integrated Circuits (ASIC)

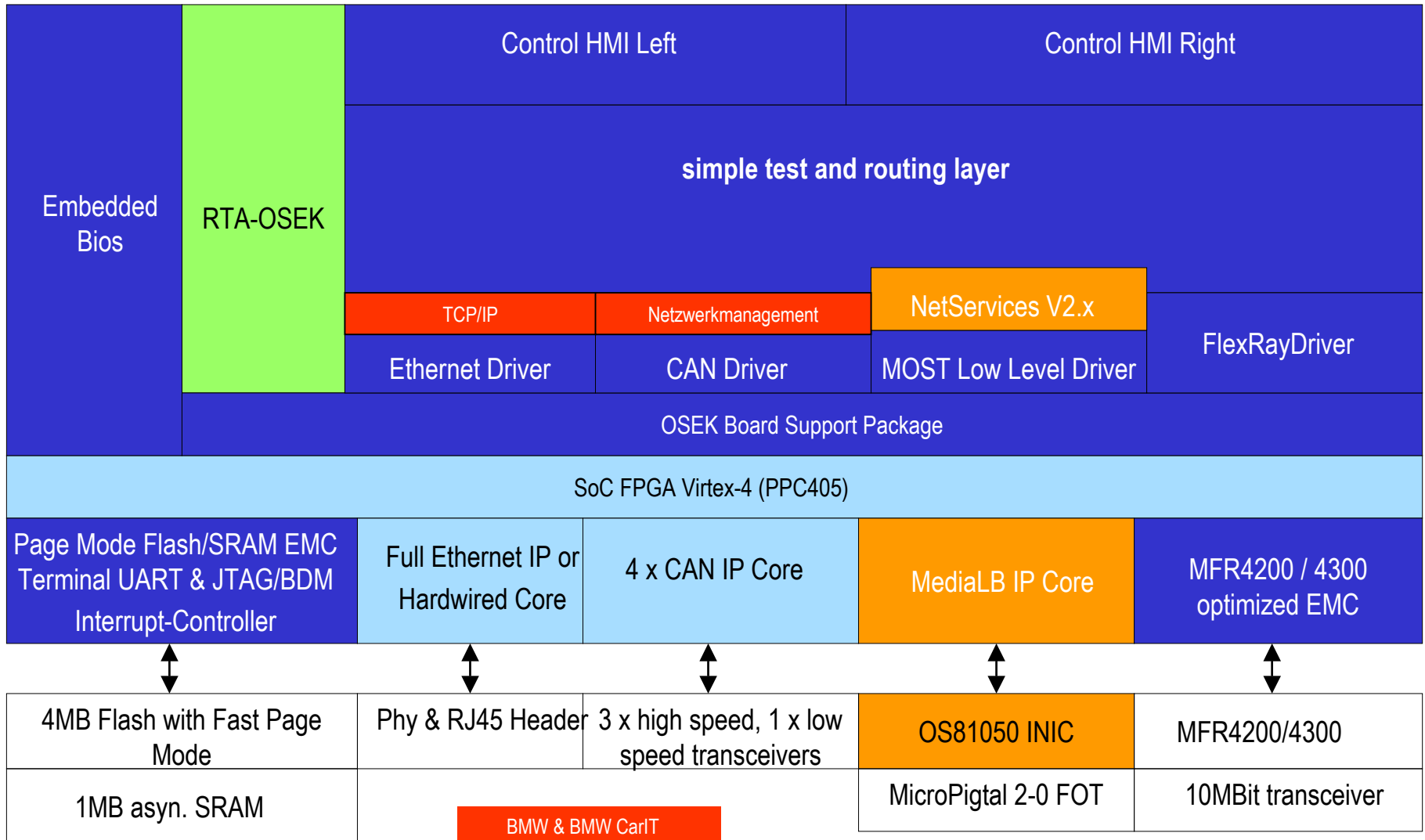
### ■ Advantages

- Highest possible integration level
- Lower cost per gate
- No configuration necessary

### ■ Disadvantages

- Potential design risk
- Higher NRE cost
- Longer time to market
- **Obsolescence of devices**

# FPGA-based Standard Core





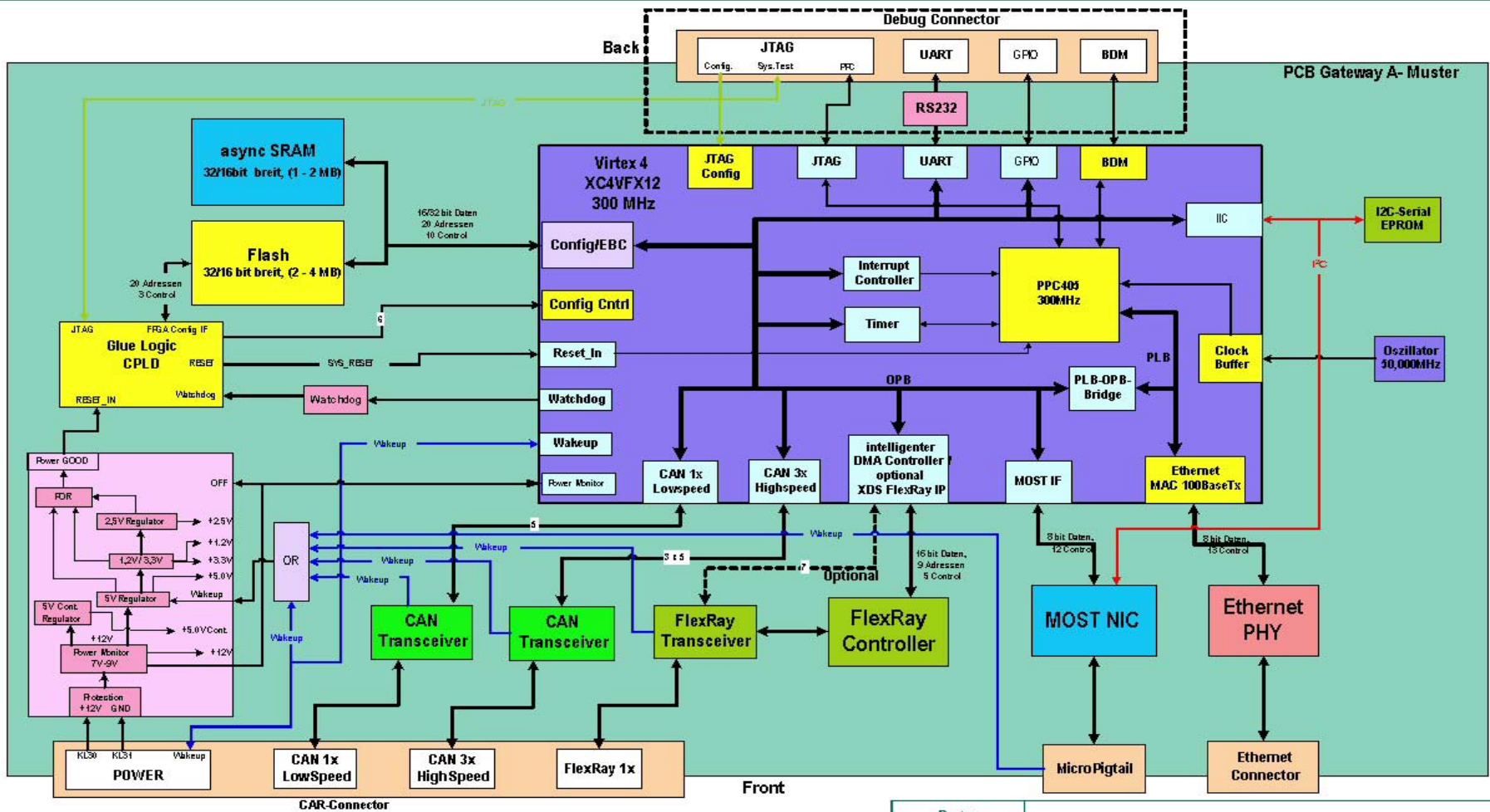
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# Rapid Prototyping Platform: SPYDER Generation III Platform



# Application Example Complex Gateway



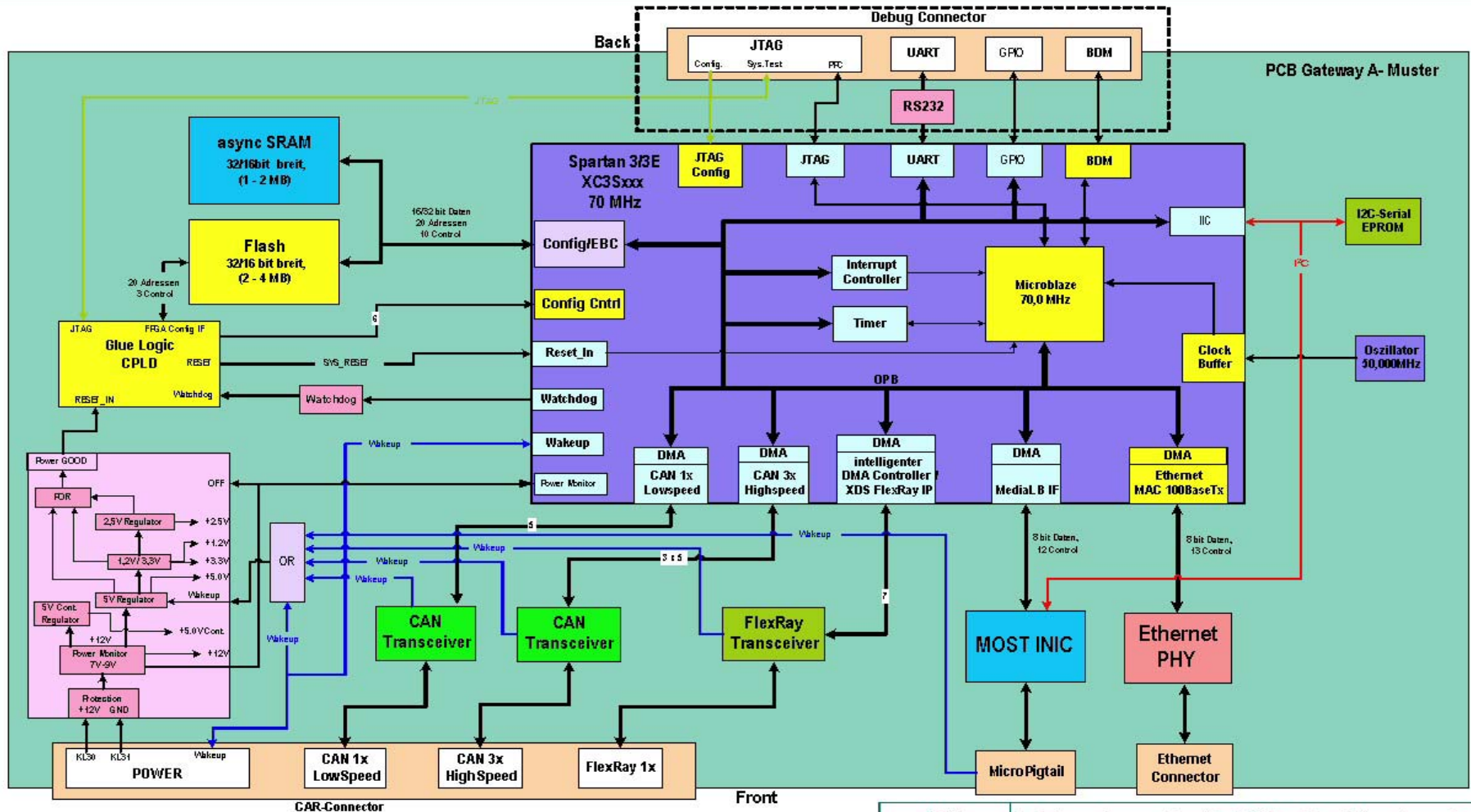
Optional: Nur für Entwicklung

Date: 19.04.2005  
 Author: Carsten Oetker  
 Version: 1.0

**Gateway A-Muster**  
 Blockdiagramm

Department	<b>X2E GmbH</b>
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# Future Cost Reduction Strategy: Low Cost FPGA



  Optional: Nur für Entwicklung

Date: 21.06.2005  
 Author: Carsten Oetker  
 Version: 1.0

## Future Low-Cost FPGA - Architecture for Gateway

Department: X2E GmbH



- Most important tasks of future automotive embedded system design:
  - Complex Software Development
  - System Integration
  - Validation, verification, test, debug
- **Demands: Early target hardware availability**
- Solution: FPGA based approaches (SoC FPGA or Low Cost Series) used for mass production:
  - FPGAs enable high degree of design re-use and adaption to future products
  - Rapid Prototyping methods: SPYDER-Generation III platform
    - Early design validation: Example A-Sample of a Gateway
- FPGA can solved the "hardware standardization" challenge



- Totally programmable hardware based on low cost FGPAs
  - System architectures based on soft processors and IP cores
  - Highly re-useable software stacks
- Entire System composed by hardware and software will become „soft“
- Cost competitive to traditional ASIC solutions
- OEMs and suppliers become more independence from silicon providers