

Collaborating Research on Optical CDMA Networks & Optical Sensor Technologies

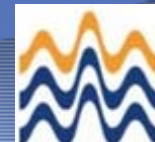
June 10, 2005

**Australian Photonics Cooperative Research Centre
Australia**

and

**Electronics and Telecommunications Research Institute
Korea**

ETRI



Contents

Project Overview

The Roadmap to the Establishment of
Project

Project Technology & Benefits

❑ Optical Communication Network

- Optical CDMA
- Secure, flexible, and reliable communication network
- 1 Gbps x 63 channels

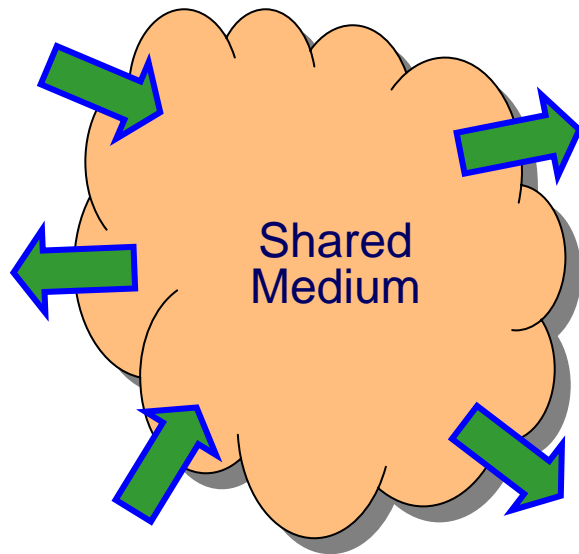
❑ Optical Sensor Network

- Ubiquitous Sensor Networks - optical sensing and networking
- Safety and Defect monitoring of vehicles – ships and planes
- Monitoring of Civil Infrastructure – bridges, tunnels, etc
- Emergent information from networked sensors

OCDMA Network

Key Features

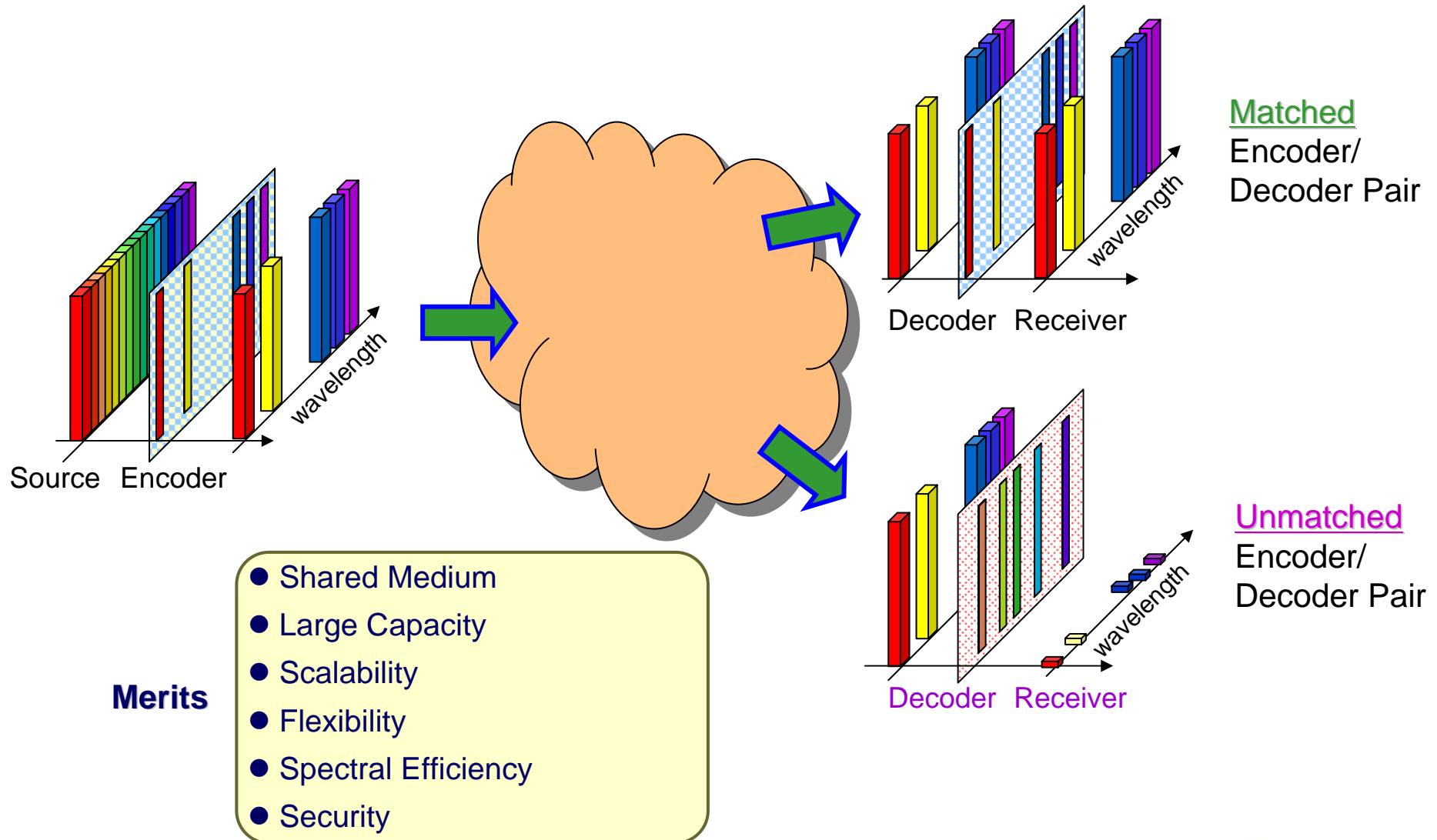
- ◆ Optical CDMA
- ◆ Shared Medium
- ◆ Added Security
- ◆ Network Flexibility



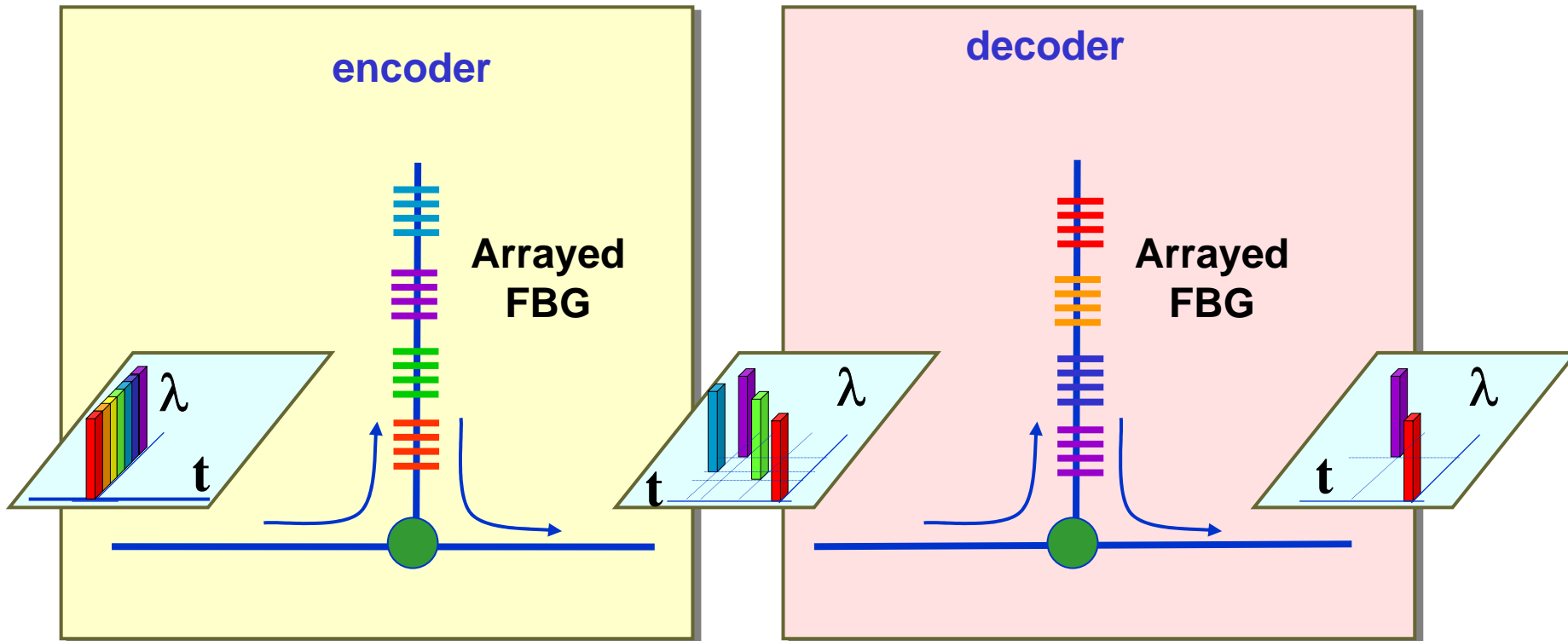
Applications

- ◆ Security Network
 - Military Network
 - Bank Network
 - Public Network
 - Business Network
- ◆ Communication Network
 - Optical Access Network
 - Local Area Network
 - Metropolitan Area Network
 - Wide Area Network
- ◆ Optical Switching Fabric
 - Optical Cross Connector (OXC)
 - Optical Router
- ◆ Optical Sensor Network

Wavelength Domain Optical CDMA



2-D Wavelength/time domain OCDMA

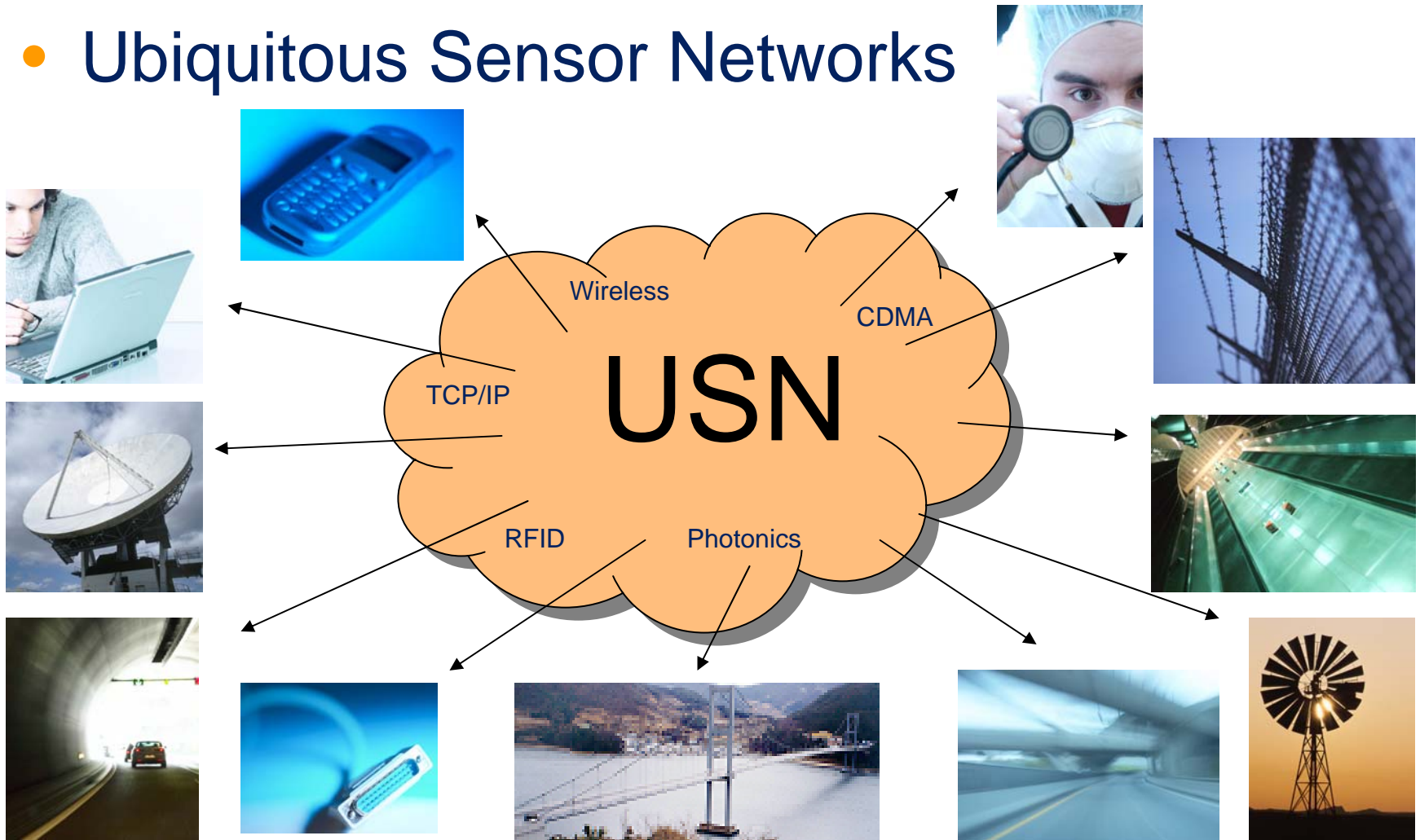


Merits

- Larger Capacity
- Enhanced Security

On the cusp of a revolution...

- Ubiquitous Sensor Networks



On the cusp of a revolution...

- **Optical Sensor Networks**

Product Benefits

Single low-cost system

- 1000s of sensors
- Throughout structure
- Whole-life

Multi-parameter

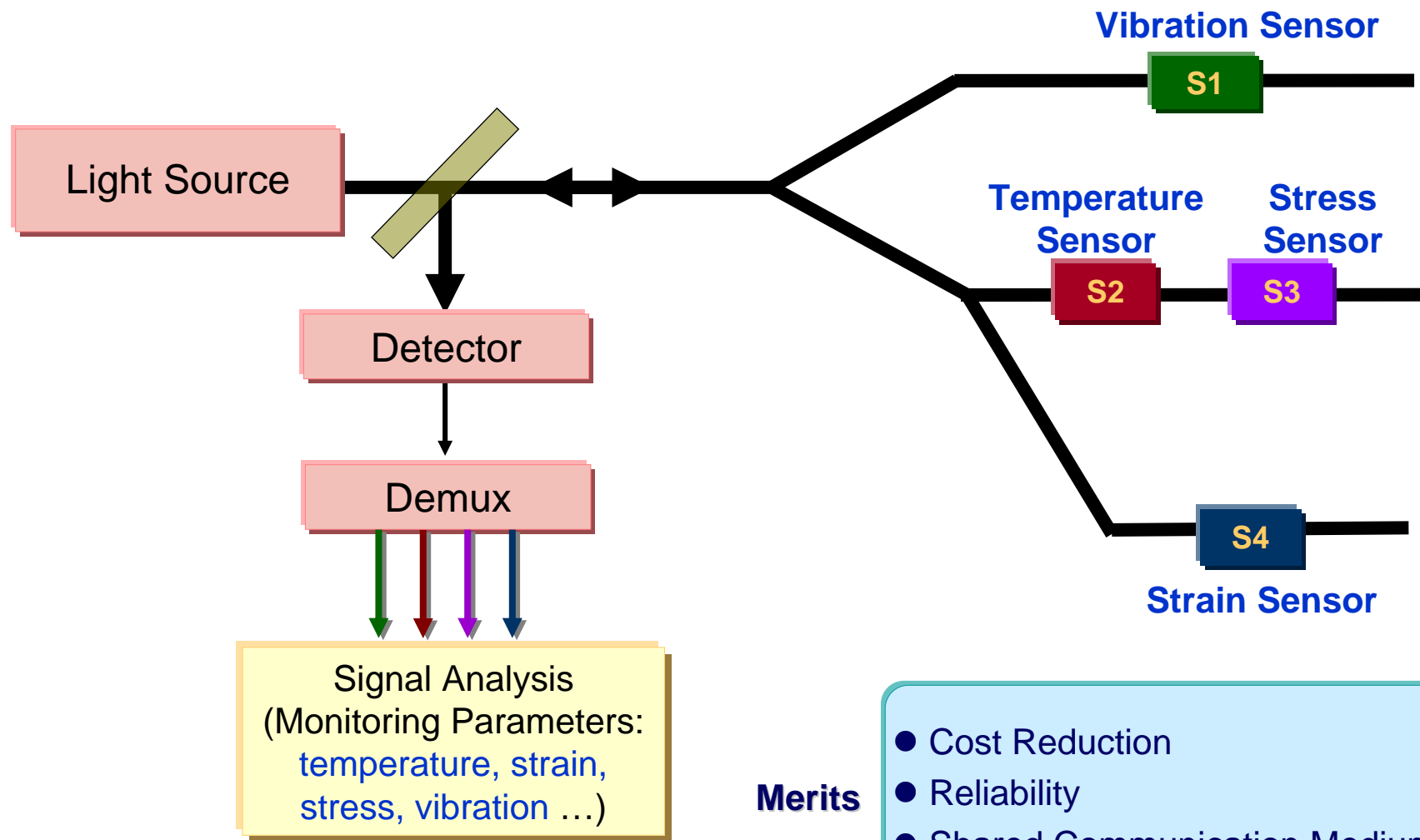
- Strain, temp,...

Interrogation

- Remote
- High speed



Optical Sensor Networks



Merits

- Cost Reduction
- Reliability
- Shared Communication Medium

Project Objectives – Value Proposition

❑ Value proposition

- OCDMA: secure, shared medium, high bandwidth access networks
– medium term and medium risk, huge market potential
- USN: diagnostic to whole-life - cost / performance transforms market
– shorter term, lower risk, ~\$2B market

❑ Research & Development

- Development of existing technology platforms – strong IP positions
- Application to emerging market opportunities
- Research to lower cost, enhance performance

❑ Commercialisation

- International market access & strong domestic demand
- Strong partnerships – Australian and Korean consortia

❑ Great team

- Necessary key participants committed
- Excellent research and commercialisation track records

Contents

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The Roadmap to the Establishment of
Project

History

- ❑ **Australia-Korea Summit (2003)**
 - Agreement to initiate a collaboration project
- ❑ **Technical Meetings (May, Aug., and Sept., 2004)**
 - Discussions between APCRC and Korean related institutes on collaboration areas
- ❑ **IITA-APCRC MOU Contract (Nov. 11, 2004)**
 - Research Areas: Optical CDMA & Optical Sensor Network
 - Period: 2005~2006 (stage 1), 2007~2010 (stage 2)
 - Funding: Matching fund from Korean & Australian governments, 3 Million USD each per year
- ❑ **Meetings for the preparation of collaboration (Dec.15/Dec. 29, 2004 & Jan. 21, 2005)**
 - Opening an APCRC Collaboration Research Center in Busan, Korea
 - Adjustment of the research topics
 - Review of the collaboration system

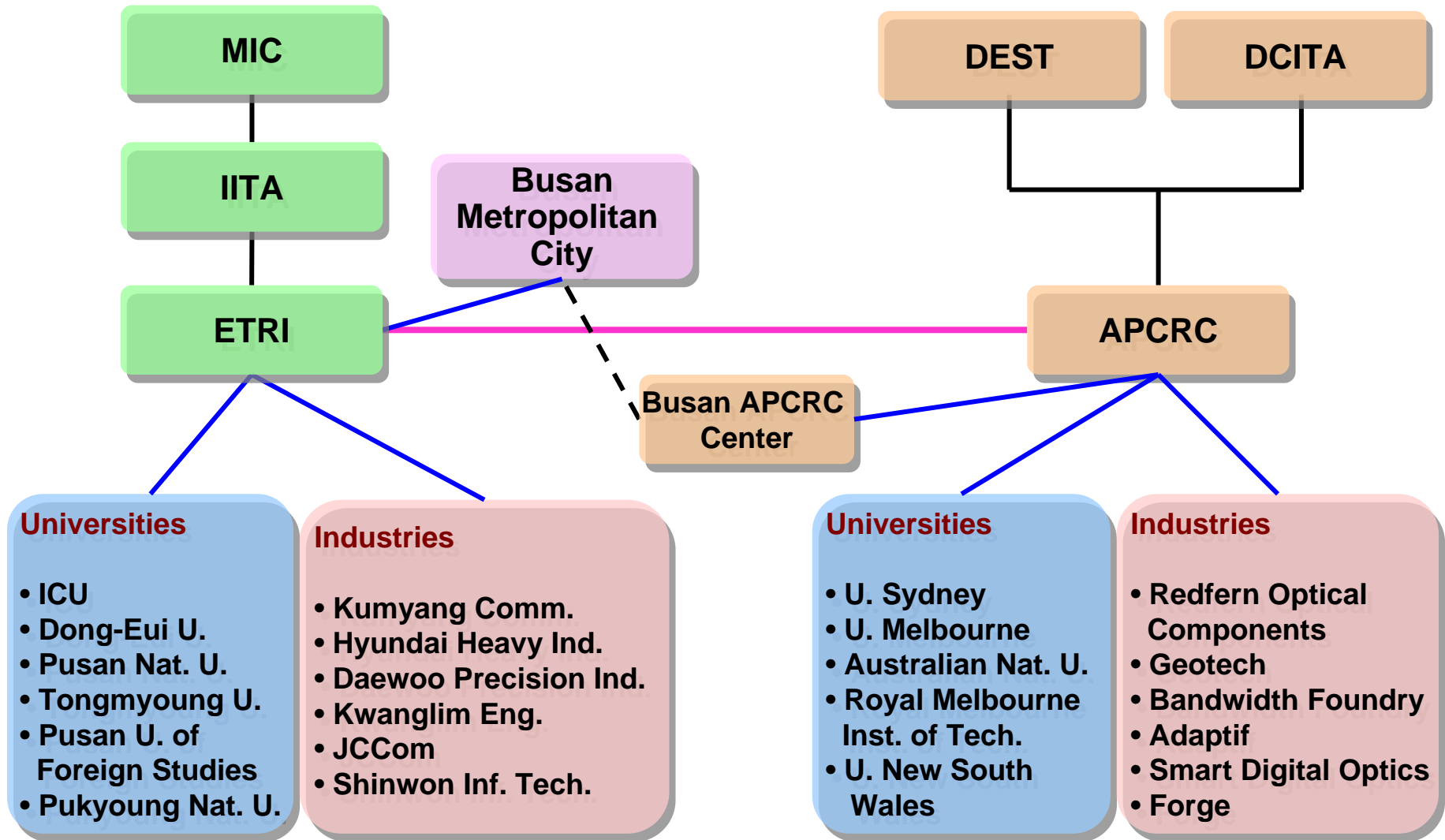
Dividing Roles

| Topics | Core Technologies | ETRI | APCRC |
|------------------------|----------------------------------|------|-------|
| OCDMA Network | Coding Technology | ○ | △ |
| | Noise Reduction Technology | ○ | △ |
| | System Architecture Design | ○ | △ |
| | Encoder/Decoder (FBG, MRR) | △ | ○ |
| | Optical Sources | △ | ○ |
| | Nonlinear Devices | △ | ○ |
| | Optical Link Technology | ○ | ○ |
| Optical Sensor Network | System Design, Signal Processing | ○ | △ |
| | Optical Transducer | △ | ○ |
| | Optical Sensor Network Design | ○ | ○ |

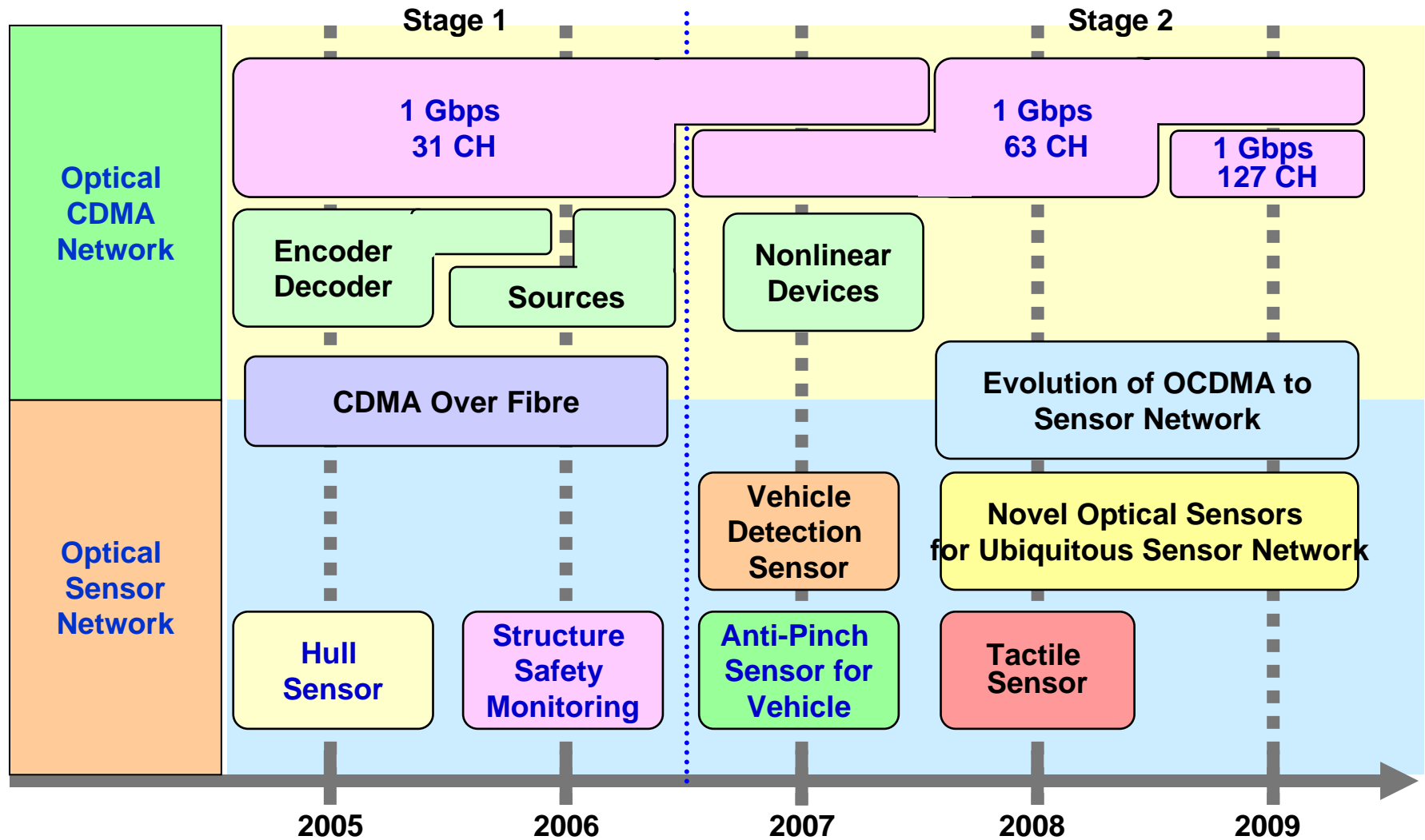
○: Major contribution

△: Secondary contribution

Collaborating Organizations



Project Roadmap



Future Steps to Collaboration

- ❑ MOU between APCRC and ETRI
- ❑ Collaboration research agreement between APCRC and ETRI
- ❑ Opening of Busan APCRC
- ❑ Launching of the Research Projects



Thank You!