

Panel: The Roles of OCS, OBS and OPS in Future Optical Networks

- Moderator: Chunming Qiao, SUNY Buffalo
- Panelists:
 - Dan Blumenthal, UCSB, USA
 - Nicola Ciulli, Nextworks, EU
 - Gigi Edwards, MCNC
 - Bernhard Fabianek, E Commission, EU
 - Juergen Gripp, Lucent, USA
 - Ken-Ichi Kitayama, Osaka University, Japan
 - Andrew Lord, BT, UK
 - Satoshi Matsuoka, Tokyo Inst Technology, Japan
 - Mike O'Mahony, University of Essex, UK
 - Tanya Politi, National Technical Univ of Athens, Greece
 - Kevin Junkoo Rhee, ICU, Korea
 - Takeshi Yagi, NTT Labs, Japan

Where Do I Come From & Stand?

- Worked on TDM systems and slotted packet switching for optical computing (1989)
- Worked photonic switching fabric design (1991)
- Worked on WDM networks
 - Wavelength requirement (1993)
 - SONET/WDM rings (1995)
 - IP-like distributed wavelength reservation (1996)
 - Fast dynamic reconfiguration (1997)
 - OBS (1997)
 - Polymorphic control (1998)

Definition

(so we're on the same wavelength)

- OCS: establishes a pipe (wavelength path or lightpath) between two edge nodes
 - Let others (e.g., IP) handle packets and do multiplexing/grooming
 - ✓ Good QoS guarantee (for admitted traffic), mature technology
 - Large wavelength granularity, and long reconfiguration delay
- OPS: same as in electronic packet switching, but payloads remain in the optical domain (optical header proc. optional)
 - Familiar architecture (except no optical RAM)
 - ✓ Great flexibility and statistical multiplexing gains
 - Per packet processing overhead; stringent synch & switching requirement
- OBS: sends a control packet first to make burst-level reservation for asynchronous switching
 - Combines the best and avoid the shortcoming of both OCS/OPS
 - Leverages the best of electronics and optics
 - ✓ Moderate processing overhead, asynchronous switching
 - ✓ Low signaling delay, and high statistical multiplexing gains
 - Lack of optical RAM causes burst dropping; also need fast switching
 - Relatively new, unfamiliar technology

Discussion Topics

- Will we see OBS/OPS (or OCS alone suffices) in FON?
 - When (if ever)?, and what are major technology hurdles?
 - If we will, where (core, metro or access), and for what Apps?
- Will OCS eventually be replaced (as POTS will) ?
 - If no, will there be two networks (e.g., OCS + OBS/OPS) or one (e.g., OBS) providing two types of services by emulating OCS and OPS
- Assume IP for a long time, choose OPS or OBS?
 - Is OBS just a nearer-term technology than OPS?
- Life after IP – OBS or OPS?