No one can exactly predict what technologies will develop in the coming years. So the best best is to prepare for everything.

[Richard Jean-Pierre]
GPON Solution
V5824G: OLT 8xGPON + 2x10Gbit + 8xSFP 1G 1U

**General**
- CPU: 600MHz
- Flash: 64MB
- SRDAM: DDR2 256MB
- Switching chip:
  - MAC: 32K
  - active VLANs: 4K
  - L3 Host Table: 8K
  - IPv4/IPv6 LPM Entries: 12K
  - L2 Multicast Group: 4K
  - FP: 3K Rules

**GPON Interface**
- 8 x GPON (SFP)

**Ethernet interface**
- 8 x GE Combo (SFP, RJ45)
- 2 x 10GBase-R (SFP+)

**Management Interface**
- 1 port MGMT 10/100Base-T
- 1 port console RS-232

**Software Features**
- **Function**
  - Standard Ethernet Bridging
  - Link Aggregation
  - LLDP
  - SP, WRR, WDRR, WRED
  - Cos/QoS acc. to 802.1p, DSCP/TOS, IP
  - SA/DA
  - IGMP Snooping
  - ContentAware Filter Processing
  - SNMP v1/2/3
  - Port Mirroring
  - GMRP & GVRP
  - **Web Management**
  - IUT-T G.984.4 OMC

**Hardware Features**
- **Physical dimensions [WHD]**
  - 432 x 44 x 300mm (Approximately)

- **Power**
  - Power consumption estimation: Approximately 70W

- **Operating environment**
  - Normal operating temperature: -20°C ~ +60°C
  - Storage and transport temperature: -40°C ~ +80°C
  - Normal Humidity: 0% ~ 90%

**INTERFACE:**
- 8-Port GPON (SFP)
- 2-Port 1GE/10GE (SFP+)
- 8-Port 1GE Combo (SFP, RJ45)
- 1-port FE for management
- 1-port RS232 for console
- Pluggable Dual/Redundancy PSU module
- 19” Rack Size with 1RU Height
- WEB MGMT
System Feature

<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
<th>Switching Capacity</th>
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</thead>
</table>
| ![Image](image) | - High-end 40 ports PON OLT  
- 40 ports G-PON OLT  
- 40 ports E-PON OLT  
- 19” Chassis with 7U  
- 8 x 100/1000Base-X + 4 x 10G XFP  
- Provide 16K L3 entry  
- Redundant power supply | 296 Gbps |

**Key Features**

### General
- **Flash:** 72MB  
- **SDRAM:** 1GB DDR2  
- **System Spec.**  
  - MAC: 32K  
  - IPv4 LPM/Host: 12K/16K  
  - L2/L3 Multicast: 1K/4K  
  - ACL ingress/egress: 4K/4K  
  - QoS: 8 Cos/port, SP, WRR, DWRR  
- **19” Chassis with 7U Height**  
- **Estimated Maximum Power Consumption**  
  - 390W (10 SIU_GPON4R+2 SFU+2 NIU)

### G-PON Interface
- **40 x 2.5G G-PON**

### E-PON Interface
- **40 x 1G E-PON**

### Network Interface
- **8 x 100/1000Base-X**  
- **4 x 10GbE**  
- **Support various XFP Transceiver**

### Indicators/Alarms
- **Link/Act, 1G Speed LED indicator**

### Management Interface
- **1 port 100BaseTx & 1port RS-232**

### Function
- **ITU-T G.984 G-PON**  
- **IEEE 802.3ah E-PON**  
- **Standard Ethernet Bridging**  
- **Active/standby redundancy**  
- **Link Aggregation**  
- **Spanning Tree: STP, RSTP, MSTP**  
- **SP, WRR, DWRR**  
- **Cos/QoS acc. to 802.1p, DSCP/TOS, IP SA/DA**  
- **IGMP Snooping**  
- **RIPv1/2, OSPFv2, BGPv4, IS-IS**  
- **IGMPv3, PIM-SM/SSM**  
- **SNMPv1/v2/v3**  
- **Optical monitoring**  
- **PON redundancy**  
- **Clock Sync: BITS, IEEE 1588, Sync E**  
- **CPLD remote upgrade**
V8500: 160 GPON OLT ports

Carrier class GPON OLT multi-service chassis
- 3.52 Tbps non-blocking layer 3 switching
- 160 GPON ports per chassis
- 8 10GbE uplink ports (XFP)
- SIP and MGCP VoIP support
- Full electronic, power and optical redundancy
- Real-time network traffic monitoring and analysis
- Support for 10G-EPON
- 16-GPON ports per card
- L3 features
<table>
<thead>
<tr>
<th></th>
<th>H645G</th>
<th>H640G</th>
<th>H640GV-03</th>
<th>H640GW-02</th>
<th>H640GR-03</th>
<th>H640RW-02</th>
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<td><strong>LAN</strong></td>
<td>1x10/100/1000</td>
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GPON Stick H640SFP

SFP with build in GPON ONT chipset.
Extended Temperature

Aplication:
- Business customers
- Wireless backhaul
• GPON - Gigabit Passive Optical Network.
• The only active network elements are OLT (Optical Line Termination) and ONT / ONU (Optical Network Termination / Unit)
• PON utilizes Tree network topology
• Offers data rates of up to 2.5 Gbps downstream and 1.2 Gbps upstream.
• Provides extended reach (compared to xDSL)
PON – elements

- Active (need power supply)
  - OLT (Optical Line Terminal)
  - ONT/ONU (Optical Network Unit/Terminal)
- Passive (no power is needed)
  - Splitters –
    - FBT – symmetrical and asymmetrical; up to 1:5
    - PLC symmetrical; up to 1:256
Overall GPON Data Transmission Approach

As far as one fiber feeder is used between OLT and ONUs for data transmission WDM is implemented to decouple Uplink and Downlink data paths.
Downstream Data Transmission (TDM)

- OLT broadcasts data to every ONU using TDM approach
- TDM – continuous data stream divided into frames
- Optionally FEC coding and AES encryption are applied to the user data

- Every ONT receives each DS frame and picks up only that data addressed to it by the OLT
- FEC decoding and/or AES decryption algorithm applied if required

- DS signal is distributed by a passive splitter to all ONUs connected to it via separate fiber link

To broadcast data from the OLT to all ONTs TDM (Time Division Multiplexing) is used
Upstream Data Transmission (TDMA)

To provide multiple access to a single fiber link for all connected ONUs Time Division Multiple Access (TDMA) architecture is implemented for the Upstream channel.

- OLT collects data from all ONUs and filters it with the use of ONU-IDs.
- FEC is applied to data if required.
- ONU receives data from the user ports and combines them into bursts.
- For synchronization purposes each ONU transmits its data in a strict accordance with the Bandwidth Map generated by OLT.
- Using DBA mechanism OLT can rearrange US BW to provide more resources to those ONU tightly loaded with traffic.
- For synchronous transmission within TDMA stream each ONU introduces equalization delay.
Stage 1

Network Division
Stage 3

Network Division

[Diagram of network division with various ONU nodes and splitters marked as Stage 3]
GEPON with 10G-EPON

NOTE – Each ONU receives its downstream signal from the correct wavelength

1G EPON downstream (1490nm ±10nm)
1G EPON upstream (1310nm ±50nm)
10G EPON downstream (1577nm -2, +3nm)
10G EPON upstream (1270nm ±10nm)

1260~1280nm
XG-PON1 = 10G Downstream / 2.5G Ups
XG-PON2 = 10G Downstream / 10G Upst

GPON leads access market growth through 2016, says Dell’Oro Group

August 15, 2012
Lightwave Staff

A new five-year forecast by Dell’Oro Group predicts increased sales of GPON optical line terminals (OLTs), DOCSIS 3.1, CMTS and VDSL infrastructure equipment through 2016. Driven by growing bandwidth requirements, the report says GPON will show the fastest growth, followed by CMTS and VDSL, offsetting a trend of declining revenue for slower-speed ADSL equipment.

“Our forecast for GPON growth is driven by deployment in China as well as increasing projects in other global regions,” says Steve Nozik, principal analyst of access research at Dell’Oro Group. “For CMTS, growth will be driven by rapidly increasing Internet traffic, competition with telecom service providers, and an increasing focus on the small and medium-sized business market among cable operators as well as a migration to IP video service.”

The report also expects DOCSIS to continue as the primary cable broadband technology for at least the next five years due to additional channel bonding being used to meet increasing bandwidth needs. VDSL growth will be driven by its higher bandwidth capabilities in association with emerging vectored technology aimed at extending the life of copper infrastructures by eliminating crosstalk.
GPON with TV services

CATV overlay
- 1310nm (1260-1360) Upstream (ONU do OLT)
- 1490nm (1480-1500) Downstream (OLT do ONU)
- 1550nm (+/-10nm) for CATV/DVB-C/DVB-T

RF Overlay 1550 nm

Video Headend
Soft Switch
IP Router
IPTV

Optical Line Terminal
GigE
IGMP

Passive Optical Splitter
1550 nm
1490 nm
1310 nm

Video Headend
IPTV

GigE
 IGMP
GPON with IPTV/multicast

- FTTH is great for IPTV
- Multicast is the term which is connected with ISO/OSI L3 not L2. DASAN has implement proper multicast support based in GEM-port 4094
- More customers watching same channel – less bandwidth needed
DVB-T to the House cooperative

- Socket fee / maintains fee instead of own antenna
- Some of the building forbidden own antennas
- 1-wiring in the building

• Socket fee / maintains fee instead of own antenna
• Some of the building forbidden own antennas
• 1-wiring in the building
Two PON networks one for GPON second for RF one way transmission
GPON z CWDM Overlay

GPON + CWDM OVERLAY

* schemat poglądowy
* w przypadku stosowania CATV Overlay - z wyłączeniem fal 1530 oraz 1550
GPON: with CCTV monitoring

DASAN GPON OLT V5812

GPON splitter

ONT GPON DASAN H640G

PC

DASAN GPON ONT

PC

IP-CCTV Camera
Thank You!