



white paper

for reliable network
with redundant optical path and/or network devices

Optical Switch System NSW Series

August 2007

Optical Switch System for reliable network with redundant optical path and/or network devices

- Restoration of network path and/or device
 - Backup network device for System Software update
- New NTT Optical Switch Offers Unprecedented Reliability

problem statement

“I’m the head of a start-up broadband networking company. We’ve been growing, and we anticipate that we’ll be growing even faster in the next year. We need to be able to upgrade without any interruption of service between our Internet exchange and our ISP networks.”

Does that problem sound familiar? How about some of these snippets of conversations overheard at a recent trade show?

“When I’m hot-switching video signals, my customers complain of frame drops. How can I avoid them?”

“We’re anticipating changes in the demands that are placed on our equipment, so I’m looking for switches that can easily adapt to our changing needs—scalability.”

“Same for my company. We’re an ISP, and what we need to be absolutely sure of is uninterrupted service to our customers during routine maintenance.”

“We’re an ISP, too, and we appreciate the need for reliability. We can install redundant modules, but that’ll mean establishing additional ports, and they’re really expensive, like \$10K to \$30K each. We can’t afford that kind of redundancy. On top of that, the add-on port may not work properly.”

“I’m about to relocate my central office, and I’m worried about service interruptions.”

“We’re having big problems with the reliability of power in our area—all-too-frequent (but still unpredictable) brownouts, blackouts, and shutdowns—and we’re anticipating that the problem will be getting worse before it gets better. What’s more, getting reconnected seems to take forever.”

“We need something that can work with as many as eight optical switches—in a single chassis.”

“My equipment has to work in a link aggregation environment.”

“What we provide to our customers makes us operate in a variety of conditions—Web, SNMP, Telnet, and SSH. We need an optical switch with that kind of flexibility.”

“Our network has to be managed remotely. We need to find equipment that will allow us to do that.”

“Redundancy, redundancy, everyone talks about redundancy. But is there an optical switch that really delivers on it?”

“Where can I find a reliable optical switch that conforms to Telcordia standards?”

NSW solution

Nippon Telephone and Telegraph (NTT) Advanced Technology Corporation has an answer to all of these questions and problems: its new Intelligent Optical Switch System, the NSW series. Here’s what it looks like:



Let’s look again at some of the problems and concerns that companies like yours have had and see what the NSW series switch can do for you:

- Power shutdown and reconnection woes: the NSW series offers self-latching optical switching devices that maintain the switching status in case of power outages and problems in reconnection.
- Frame drops when hot-switching video signals: the NSW switch incorporates a maximum switching time of 10 ms, minimizing frame drops.
- Scalability to changing equipment demands: the NSW switch features plug-in modular design, allowing you to select the configuration that’s optimal for the scale of your operation. It does this with:
 - Selectable configurations for optical switch modules: 1x2, 2x4, and 2x2
 - Each module contains two optical switches
 - Both SM and MM switch modules are available
 - Plug-in modules—up to four of them, for a maximum of eight optical switches—can be accommodated in a single 1U chassis,
 - Fiber modes: single mode and multi-mode
 - Optical power detection choices: modules with and without power detection
 - Connector choices: SC, SC-APC, LC, and MU
- Varying operating conditions: the NSW switch can respond to varying operating conditions, including a Web-based control panel, SNMP-based management, and

Telnet/SSH. It does this by allowing for more than one management control interface:

- a 10/100Base-T LAN interface for Web, Telnet, SNMP, and TFTP controls
 - an RS-232C interface for console command
 - The Web-based control panel can indicate the optical switch status, and the optical power level can also be monitored remotely.
 - Remote switching and logging can be accomplished by Web browser and SNMP
- Upgrading equipment in an Internet exchange so that ISP networks experience no interruption of service: the NSW switch will accomplish this—no service interruptions—because it operates at the interface of an IX and an ISP. In fact, wherever points of interface exist (between a higher and a lower layer), the NSW switch can be used.
 - Central office relocations and interruptions of service: using the NSW switch in such situations will reduce down time and prevent service interruptions.
 - Instead of having to make all the new connections at one time, with the NSW switch you can do them one at a time.
 - Then, when all the new connections have been made, you can effect the change all at once.
 - Conformity to Telcordia standards: the NSW switch employs highly reliable optical switching devices that conform to Telcordia GR-1221 and GR-1073.

Now, what about the matter of redundancy? The NSW switch offers unparalleled security through redundancy in a variety of applications:

- Additional security in network equipment systems:
 - Redundant routers for backup
 - Redundant ATM switches for backup: in this configuration the optical switch offers redundancy in the ATM switches connected to the trunk network between central offices
- Automatic switching of transmission paths: redundancy in the backbone:
 - *Any* kind of signal can be passed through the NSW switch, because the switch is Layer 0.
 - The NSW switch is transparent to a protocol. Because of this, using the NSW switch makes multiplexing and demultiplexing with CWDMs unnecessary.
 - These features will be of interest to CATV providers who offer Internet services.
- Applicability to a link aggregation environment: redundancy in link aggregation:

- Two optical channels trunked together by link aggregation can be connected to two interlocked optical switches. When an optical power drop is detected in one of the active ports, the two interlocked optical switches are switched together, maintaining the total bandwidth of two optical channels.
- A maximum of eight 2x4 optical switches can be interlocked in this manner.
- With link aggregation, you can upgrade your equipment simply by adding another Ethernet switch, doubling capacity without replacing your current NSW switch.

What will it cost you to bring the advantages of the new NSW optical switch to your operation? A minimum configuration, consisting of one base unit and one 1x2 switch module (consisting of two 1x2 switches), plus an optical power detection module, costs approximately \$7,700 (FCA Tokyo price, somewhat less without optical power detection). Generous discounts are available for volume sales.

summary

In short, what does the new NSW series of optical switch units offer? They provide you with high reliability in optical network facilities (core to edge to access networks). They do this by switching optical fiber circuits between the main and the standby automatically, with optical power level monitoring. Their modular design means that they're flexible and customizable. They provide protection to various optical network paths and devices. They provide swiftness, safety, and stability in operation and maintenance. And they're scalable—you can stop with just one module.

NSW Specifications

Switch configuration	1x2, 2x4, 2x2
Self-preservation function	Yes
Switching time	≤ 10 ms (from applying the switching signal to finishing switching)
Insertion loss	≤ 2 dB (with optical power detection), ≤ 1 dB (without optical power detection)
Return loss	≥ 40 dB
Crosstalk	≤ -60 dB
Switching life	10,000,000 times
Optical connector	SC, SC/APC, MU, LC
Applicable fiber	Single-mode or multi-mode
Control interface	10/100Base-T, RS-232C
Dimensions	480 x 380 x 44 mm (w x d x h)
Power supply	AC 85V-265 V; DC 36V-76V
Power consumption	≤ 20 W
Operating environment	0°C-50°C / 5%-85% RH (non-condensing)

Specifications are subject to change without notice.

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