OneChip: The application of Photonic Integration in the FTTH market

– Interview with Andy Weirich, OneChip VP of Product Line Management

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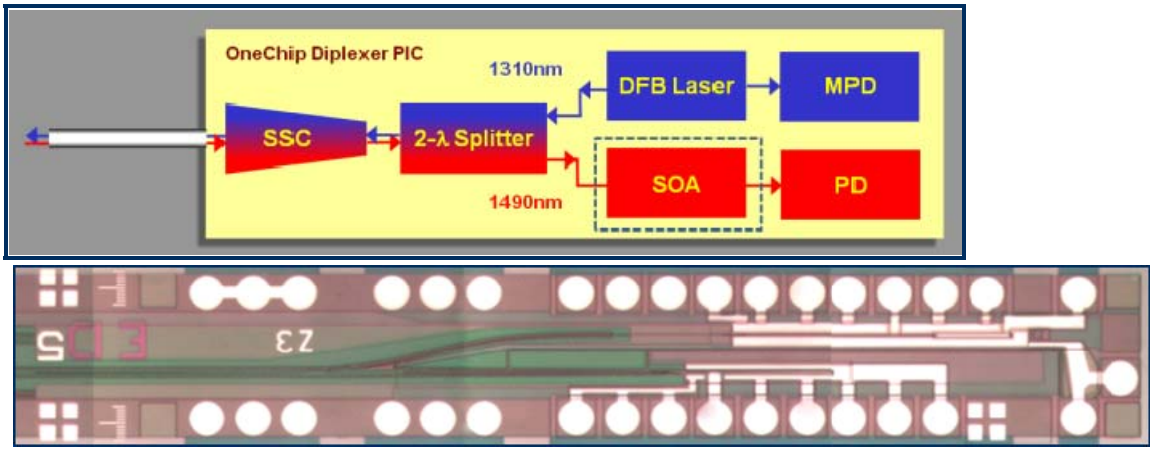
Coming to the FTTH market, the new player, OneChip, is enormously proud of its success

OneChip Photonics, a private start-up company headquartered in Ottawa, Canada, is mainly engaged in low-cost, high-performance optical transceivers' R&D and manufacturing. Its products, for the first time, are made from a single chip of Indium Phosphide (InP)-based photonic integrated circuits, for access networks and other broadband market applications. The cost and performance bottlenecks have been hampering the deployment of FTTH technology. OneChip's new breakthrough methods and technologies in these two areas are said to eliminate barriers and stimulate new businesses and personal broadband applications.

Ovum's research indicates that the current global FTTH market has nearly 33 million customers. By 2013, this figure will reach 100 million. "Every FTTH user will need an optical transceiver," Ovum says. The market demand is huge.

"Presently, the FTTH optical module market is extremely competitive, and it has attracted many competitors on the market. Nowadays, OneChip's entering indeed sounds crazy, but we have our own unique technology and this technology can help us win market opportunities," said Andy Weirich, OneChip Vice President of Product Line Management. "Our photonic integrated circuit (PIC) technology can significantly reduce the cost of optical modules and realize large-scale automated production. The FTTH market will undoubtedly become the new "favorable playing ground" of photonic integration technology. Our entering the market, it now can be said, is the best place to start."



OneChip Diplexer PIC block diagram

Photonic integration plans grandly for its first debut?

Currently, InP-based photonic integrated circuit (PIC) technology has been in real application in the field of long-haul transmission. The representative in this market is a company called Infinera, which has already received certain success in long-haul transmission and in metro areas around the world, with 41 customers and more than 10,000 photonic integrated circuits shipped. It can be said that photonic integrated circuit technology has been getting the show on the road. Heavy Reading optical analyst, Sterling Perrin, once said: "Infinera's photonic integrated circuit product development roadmap shows that we are opening a new era of optical networking, that is, photonic integration times."

However, what is noteworthy is that Infinera has not used this technology in the field of access networking, which makes for market conjecture. Andy Weirich gives his views: "Indeed, Infinera applies PIC technology mainly into the field of long-haul DWDM. They have more complex chips, and size is also great. The most important thing is the low yield, which causes the relatively high cost. Simultaneously, Infinera's chip has integrated much more features, which requires extreme consistency, and this brings a lot of difficulties to volume production. These difficulties limit their capability to get more applications in larger scale. In contrast, OneChip implements some unique reforms by introducing a "monolithic PIC growth" process in the photonic integration technology, to solve the yield problems that arise from the usual multiple-step growth process. The ultimate result is that we can produce thousands of chips on a wafer, while Infinera usually only gets 5-6 pieces per wafer."

According to Weirich, "In general, the biggest advantages of our PIC technology are low cost, high reliability, and small size. Large-scale and fully automated production processes can dramatically reduce the cost. The effective integration of components can also greatly improve product reliability. Besides, the compact size can also facilitate the realization of more complex functions and integration. For example, we have a unique optical amplification technology integrated into the PIC, which can meet more onerous link budget requirements."

Doug Cheng, OneChip's Vice President of FTTx Product Line Management, says, "At present, we are in the sampling stage. At CIOE, we are demonstrating our OLT / ONU optical module series, including the symmetric EPON OLT / ONU modules, as well as 2.5G EPON products. GPON products will be released soon. We are expecting small-scale shipments in the fourth quarter of this year, and large-scale shipments in the second quarter of next year."

Strong competition and advantages over PLC and silicon photonic integration technologies

At present, there exist several important optical integration technologies, such as PLC (Planar Lightwave Circuit) technology, silicon photonics technology (Intel and SiFotonics as representatives) and photonic integrated circuit (PIC) technology. PLC is no longer a new concept. In 2003-2004, there were many small companies in North America developing PLC-based products. "At the time, PLC manufacturers thought that optical modules produced by this technology could be cheaper than traditional assembly processes, and packaging technologies are also better than traditional techniques," Weirich said. "But in the course of the practical application of PLC technology, it reveals two major weaknesses: firstly, yield rate is very low; secondly, the key components still need to be outsourced. In other words, those key components will still account for more than 70% of the total module cost, even if the processing cost is assumed to be zero. The cost control is considerably limited. This is why, in recent years, PLC-based optical modules are still high cost."

Weirich added that silicon photonics technology could be a promising technology, which will have a certain position in the market. But, at the moment, the biggest problem of the current silicon photonics technology is its inability to produce silicon-based active optical components, which have the wavelengths between 1300nm and 1550nm. From this point of view, silicon photonics and PLC technologies are very similar – unable to produce the devices they need to.

"Now, for OneChip's PIC-based optical components, there is no need to purchase any active optical component," Weirich said. "All integrated components, including the core lasers and photon detectors, can be self-produced and integrated, which enables to realize cost control more effectively."

Optimistic about China's largest FTTH market, desire to open up new application fields

"Now, you can say for sure that the Chinese market will be the world's largest and most attractive market," Weirich said. "Three years ago, Japan and South Korea were the world's FTTH locomotive, but now, China will no doubt be an absolute leader." But when we asked what the biggest difference is among the Chinese market and other foreign markets, Weirich was sure to tell editors that there are three major differences, "first is cost, second is cost, and the third is cost again!" The Editor fell in a faint on the spot.

Besides the FTTH market, of course, OneChip also is very interested in other emerging markets. "OneChip's fully integrated technology can help the market fully realize the big potential of FTTH technology, and it is very promising to be involved in other optical communications markets." Weirich said. "PIC-based technology will also play a significant role in other areas. In the future, we will lead our way to telecommunications, data communications, and to the end-user market."

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