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The Status of WiMAX Industry Development in Taiwan

(I) Supply & Demand

When we classify communication products according to country of manufacturer, Taiwan's WLAN, xDSL CPE, SOHO Router, Ethernet LAN Switch, and Cable CPE all rank among the world's top three in their respective categories in terms of gross domestic and overseas production. It is obvious that Taiwan has enormous potential for Network Communication CPE (customer-provided-equipment) production.

Top Three Global Communication Products Made by Taiwan in 2006

Product / Category	Production Value in 2006		Gross Production in 2006		World Ranking	Ranking Reference
	Million USD	Global Market Share	Unit (thousands)	Global Market Share		
WLAN	2,013	90%	116,735 unit/piece	95%	1	Production volume
xDSL CPE	1,696	83%	55,035 sets	82%	1	Production volume
SOHO Router	1,091	80%	33,486 units	80%	1	Production volume
Cable CPE	783	86%	17,351 units	72%	1	Production volume
Ethernet LAN Switches	1,049	6%	160,043 sets	41%	1	Production volume

Note: (a) The 2006 NTD:USD exchange rate was 32.5:1; (b) items are ranked according to global market share, from largest to smallest.

Source: ITIS, 2007/03

With regards to WiMAX development, CPE pricing exerts a great influence on market growth. Encouragement from the Taiwanese government and the efforts of major international manufacturers, in combination with

Taiwan's network communication CPE manufacturing capabilities, should speed up the reduction of WiMAX CPE prices and boost overall output. According to data from the Institute for Information Industry's (III) Market Intelligence Center (MIC), the annual output of Taiwan's WiMAX industry was expected to reach US\$160 million in 2007, representing a year-on-year growth of 604%. Taiwan's production of WiMAX equipment and facilities is expected to reach US\$4.28 billion by 2012 (approximately US\$540 million for base station facilities and US\$3.74 billion for CPE).

(II) An Analysis of Existing Gaps in the Industry Supply Chain, Investment Niches, and Prospective Foreign Investors

Implemented in 2005, the "M-Taiwan Project" (for the creation of a mobile, or wireless, Taiwan) aims to transform the country from "E-Taiwan" to "M-Taiwan" using WiMAX, and to boost industrial development through application services.

M-Taiwan Project Milestones

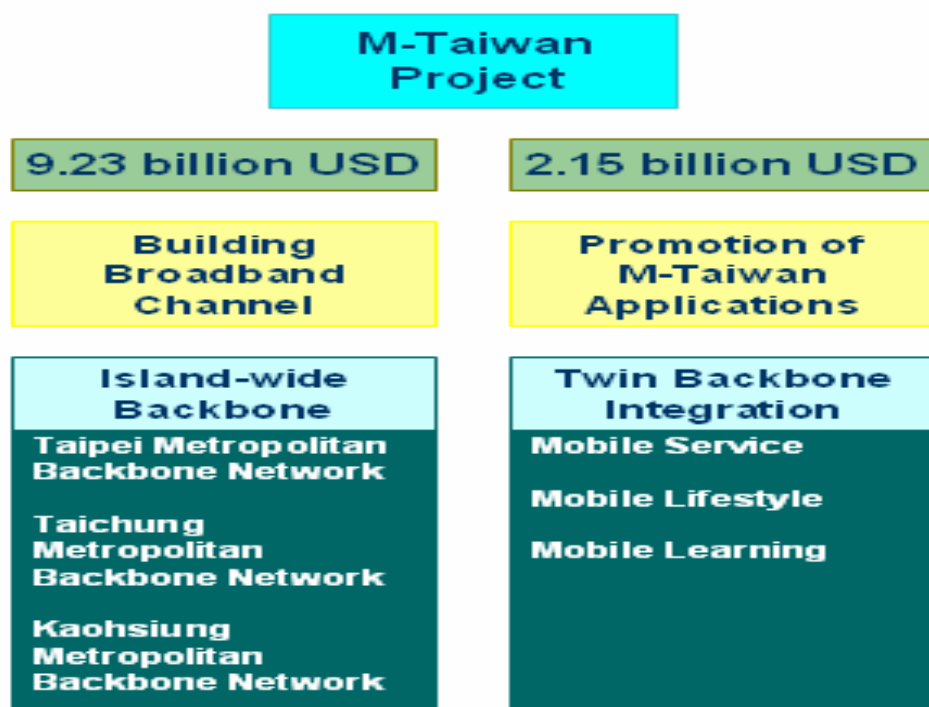
Time	Events
2003-2006	Cooperation Memo signed between the Ministry of Economic Affairs and Intel "Taiwan WiMAX Development Blueprint Working Group" established "WiMAX Fast Track Project", and "M-Taiwan Project" implemented
2007/03	Executive Yuan announced the liberalization of wireless broadband access operations
2007/04	The National Communications Commission (NCC) announced that it was accepting applications for wireless broadband operators, and relevant application procedures.
2007/05	Technical Cooperation Memo signed between the MOEA and NEC, NORTELL, R&S, and other major international WiMAX manufactures.
2007/07	The NCC announced the six winning bids for wireless broadband operators. These include Global Mobile Corp., VMAX Telecom, and First International Telecom in northern Taiwan; and Far Eastone Telecommunications Co., Tatung Infocomm, and Vastar Cable System Co. in southern Taiwan.
2007/10	Technical Cooperation Memo signed between the MOEA and Alcatel-Lucent, Motorola, Nokia Siemens Networks, Sprint-Nextel, Starent, and other major international WiMAX

	manufacturer.
2007/10	The WiMAX Forum set up, its first global mobile WiMAX accreditation laboratory in Taiwan.
2008~	Second global mobile WiMAX accreditation laboratory set up in Taiwan WiMAX service launched.

Source: Compiled for the present study, 2007/12

To speed up WiMAX development, the Taiwanese government has initiated the “M-Taiwan Project,” aimed at helping Taiwanese manufacturers enter the international WiMAX market at the earliest opportunity. It is estimated that the government will invest a total of US\$1.138 billion in the “M-Taiwan Project,” of which US\$923 billion will be invested in the basic WiMAX infrastructure. It is predicted that the WiMAX industry will attract US\$2.462 billion in private investment, and successfully establish an industry chain for upstream and downstream products including chips, terminal devices, base stations, and application services. The remaining US\$215 million will be used to promote M-Taiwan application services.

M-Taiwan Application Services Promotion Program



Source: Mobile Taiwan Applications Promotion Program Office; compiled for the present study, 2007/12

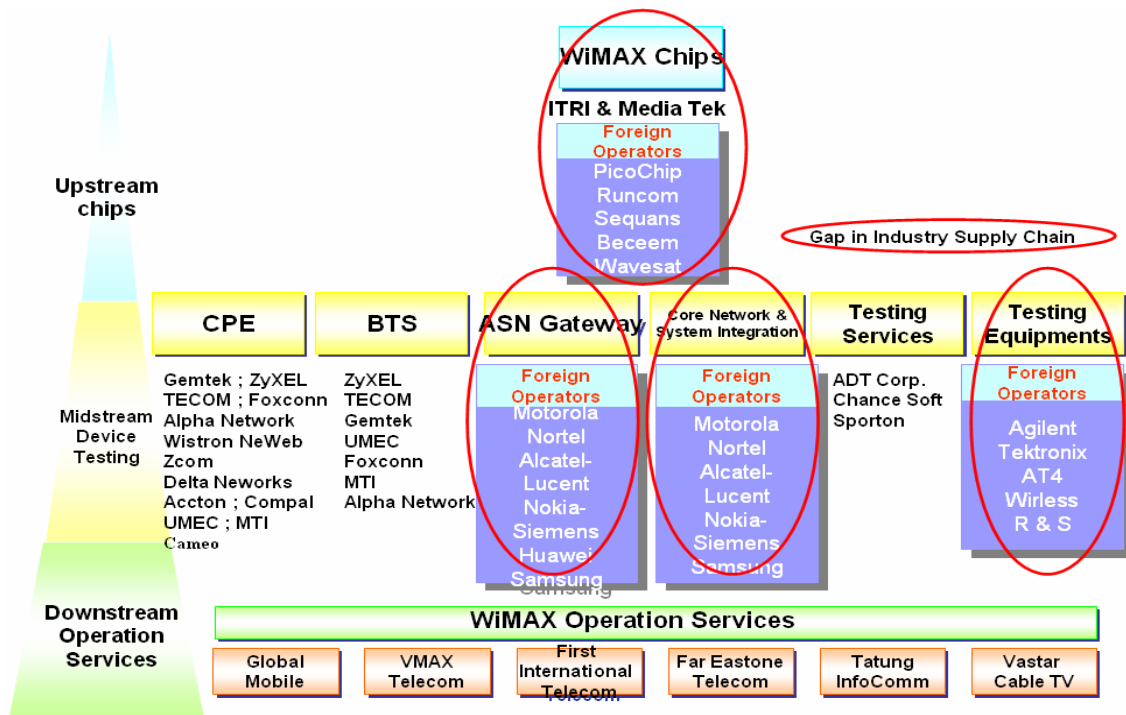
Through the “WiMAX Acceleration Project” and “M-Taiwan Project”, the Taiwanese government hopes to facilitate WiMAX industry development and build a complete WiMAX industry chain in which different sectors of the business (e.g. hardware terminal, manufacturing, software integration, operation) can work closely together. In this case, terminal device and equipment manufacturers will be able to incorporate future service requirements early on, during specifications development, and operators can then expedite the planning of an effective business operation model.

With regard to the current development of the WiMAX industry chain, CPE devices are the first and foremost WiMAX products being developed by Taiwanese manufacturers, whereas there are few developers of chips, ASN Gateway products, core network systems integration, and testing facilities. The main reason for this is that Taiwanese companies are mostly focused on

the manufacturing of terminal devices for 3G technologies, making upstream chip R&D capability a weak point for the industry. However, as Taiwan is a pioneer of global WiMAX distribution, the construction of an industry chain seems to be more important. Foreign chip manufacturers, such as PicoChip, Runcom, Sequans, Beceem, and Wavesat, are all potential targets for technological collaboration. In addition, potential foreign manufacturers like ASN Gateway, system integration manufacturers such as Motorola, Nortel, Alcatel-Lucent, and Nokia-SiemensSamsung, and testing device manufacturers such as Agilent, Tektronix, AT4, Wireless, and R&S could be introduced to the domestic market to fill industry gaps and achieve mutual benefit.

In the area of midstream devices, Taiwan's network communications companies, such as ZxXEL, Accton, Cameo, Quanta Microsystems, and Gemtek, are all involved in WiMAX technology development and product manufacturing. As for CPE, Taiwan has had a long and close working relationship with international telecom manufacturers such as Motorola, SR Telecom, Alcatel, and Sprint. For example, ZxXEL has already shipped products to Sprint Nextel, while both ZxZEL and Quanta Microsystems will supply WiMAX devices to Nortel. In addition, with Intel's support, ASUS is exhibiting its WiMAX-supporting Ecc PC at the 2008 International CES expo. Many more companies are launching wireless network devices in step with WiMAX technology.

WiMAX Industry Supply Chain in Taiwan



Source: Compiled for the present study, 2007/12

(III) Major Suppliers in Taiwan

Key WiMAX Suppliers in Taiwan

Company	Future Product Directions
ZyXEL	WiMAX network card, SO-HO/domestic router, and Outdoor CPE
Accton	WiMAX multimedia integration application devices
Cameo	WiMAX network connection devices
Quanta Microsystems	WiMAX embedded modules
Gemtek	Mainly WiMAX network card, Indoor Unit & Outdoor Unit of WiMAX modem/router/gateway

Source: Compiled for the present study, 2007/12

In the area of midstream testing, of the six WiMAX verification laboratories around the globe, four are located in China, Europe, Korea, and the U.S., while the other two are located in Taiwan. Two local companies,

ADT and Aloha, have been certified by the WiMAX Forum as a provider of fixed and mobile WiMAX verification services. With the support of local WiMAX certification labs, Taiwanese manufacturers can cut down on the time required for testing and verification, speed up WiMAX R&D, and enhance their competitiveness.

In the area of downstream operations and services, licensed operators such as Global Mobile Corp., VMAX Telecom, First Telecom, Far Eastone, Tatung Infocomm, and Vastar Cable TV System, have already begun base station construction and will soon be able to provide innovative Web 2.0 interactive services, personalized Internet, integrated communications services, remote data access, and multimedia entertainment.