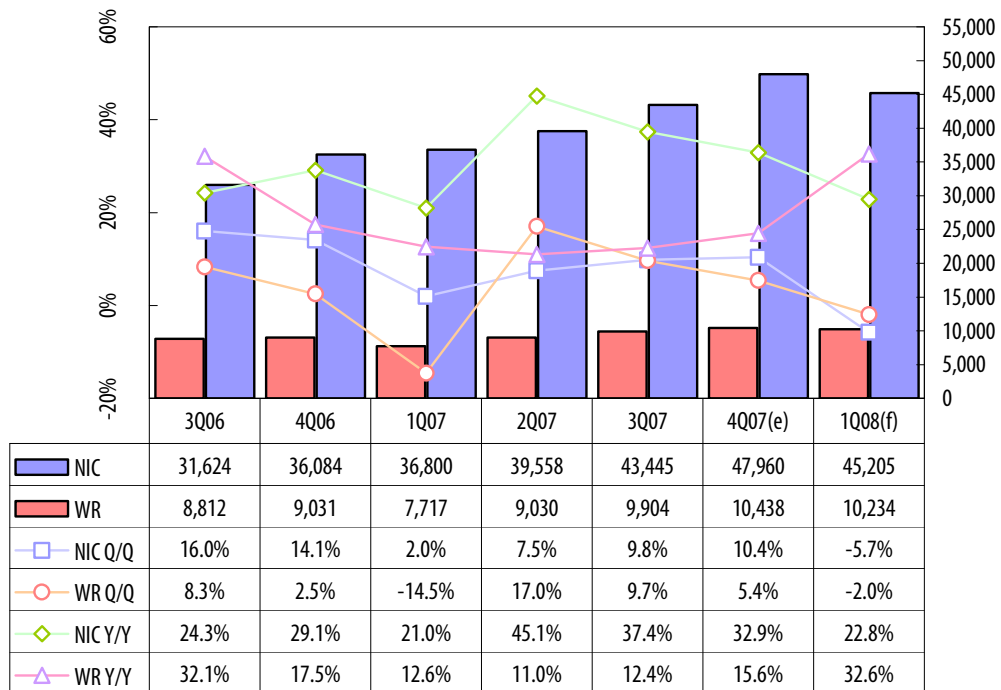# Taiwan WLAN sector

Introduction

Taiwan shipped 58.4 million WLAN devices in the fourth quarter of 2007, up 9.5% sequentially and up 29.4% from the same period one year earlier. Shipments included 48 million NIC devices and 10.4 million wireless routers (WR).

WLAN shipments will fall 5.1% sequentially in the first quarter of 2008, but will be up 24.5% from the same period in 2007.

Taiwan shipped 204.9 million WLAN devices in 2007, up 28.8% from 2006. The forecasts for next year is for Taiwan to ship 250.7 million WLAN devices in 2008, representing growth of 22.4% from 2007.

Chart 1: WLAN equipment shipments, 3Q06-1Q08 (k units)

	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)	1Q08(f)
NIC	31,624	36,084	36,800	39,558	43,445	47,960	45,205
WR	8,812	9,031	7,717	9,030	9,904	10,438	10,234
NIC Q/Q	16.0%	14.1%	2.0%	7.5%	9.8%	10.4%	-5.7%
WR Q/Q	8.3%	2.5%	-14.5%	17.0%	9.7%	5.4%	-2.0%
NIC Y/Y	24.3%	29.1%	21.0%	45.1%	37.4%	32.9%	22.8%
WR Y/Y	32.1%	17.5%	12.6%	11.0%	12.4%	15.6%	32.6%

Source: Digitimes Research, January 2008

Fourth quarter WLAN shipment growth was not strong on a sequential basis due to the absence of a powerful sales driver, but sales were up significantly on year, showing that economic worries only had a limited impact on sales. WLAN equipment shipments in the fourth quarter of 2007 were up more than 9% on quarter and 29% on year.

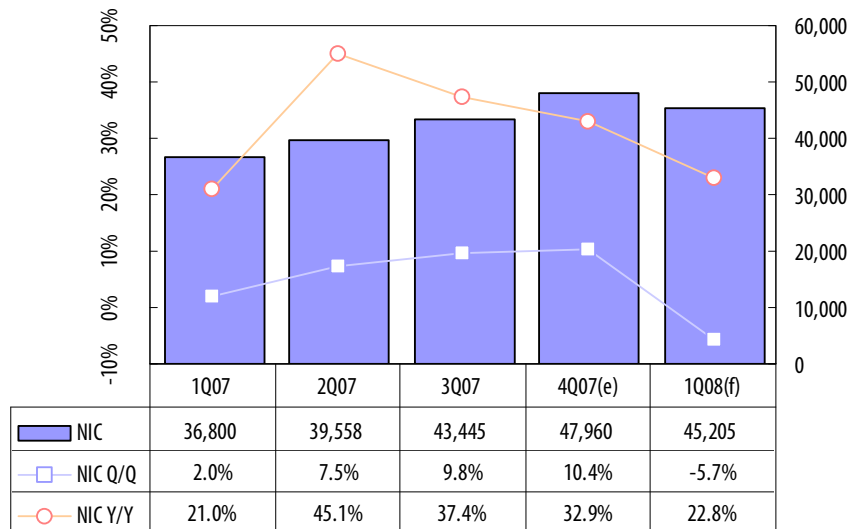Progress on draft-n standardization did spur overall WLAN equipment shipments up in 2007 but growth was weaker than expected. The introduction of a 802.11n interoperability testing (IOT) scheme also helped spur overall WLAN equipment shipments in the second half of 2007.

However, enterprises and telecom communication carriers are not motivated to procure draft-n WLAN equipment, as the standard has not yet been finalized.

Shipment breakdown

NICs

Chart 2: NIC shipments, 1Q07-1Q08 (k units)

	1Q07	2Q07	3Q07	4Q07(e)	1Q08(f)
NIC	36,800	39,558	43,445	47,960	45,205
NIC Q/Q	2.0%	7.5%	9.8%	10.4%	-5.7%
NIC Y/Y	21.0%	45.1%	37.4%	32.9%	22.8%

Source: Digitimes Research, January 2008

NIC shipments of 47.96 million units were up 10% in the fourth quarter of 2007, with shipments driven by draft-n standard NICs, especially for notebook applications.

However, shipments will decline on a quarterly basis in the first quarter of 2008 amid the low season for notebook shipments and a slowing in drops of retail prices.

Chart 3: NIC production value, 4Q06-4Q07 (US$ million)

	4Q06	1Q07	2Q07	3Q07	4Q07(e)
Production value	409.2	411.8	410.4	432.2	469.9
Q/Q	19.3%	0.6%	-0.3%	5.3%	8.7%
Y/Y	22.7%	27.0%	38.8%	26.0%	14.8%
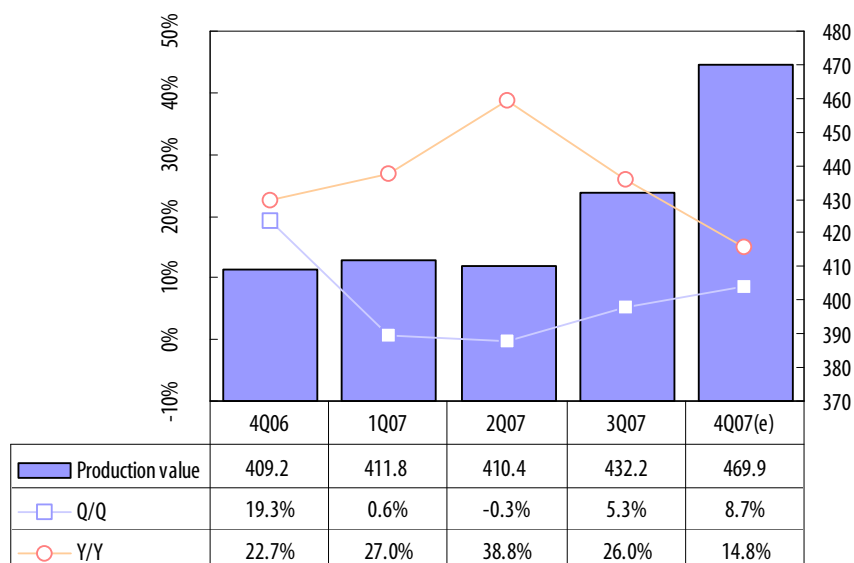
Source: Digitimes Research, January 2008

Chart 4: NIC ASP, 4Q06-4Q07 (US$)

	4Q06	1Q07	2Q07	3Q07	4Q07(e)
☐ ASP	11.35	11.19	10.37	9.95	9.80
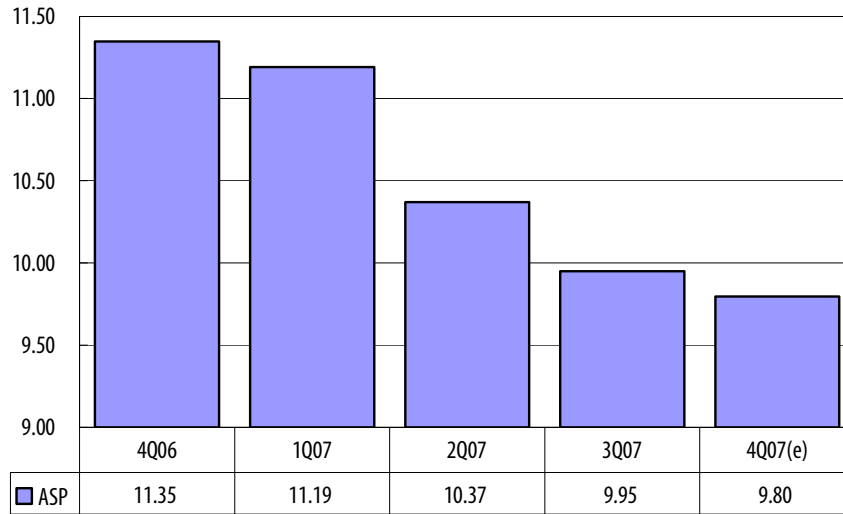
Source: Digitimes Research, January 2008

NIC sales for the Draft-n standard pushed revenues, but with chipmakers continuing to cut quotes, the ASP fell 1.5% sequentially.
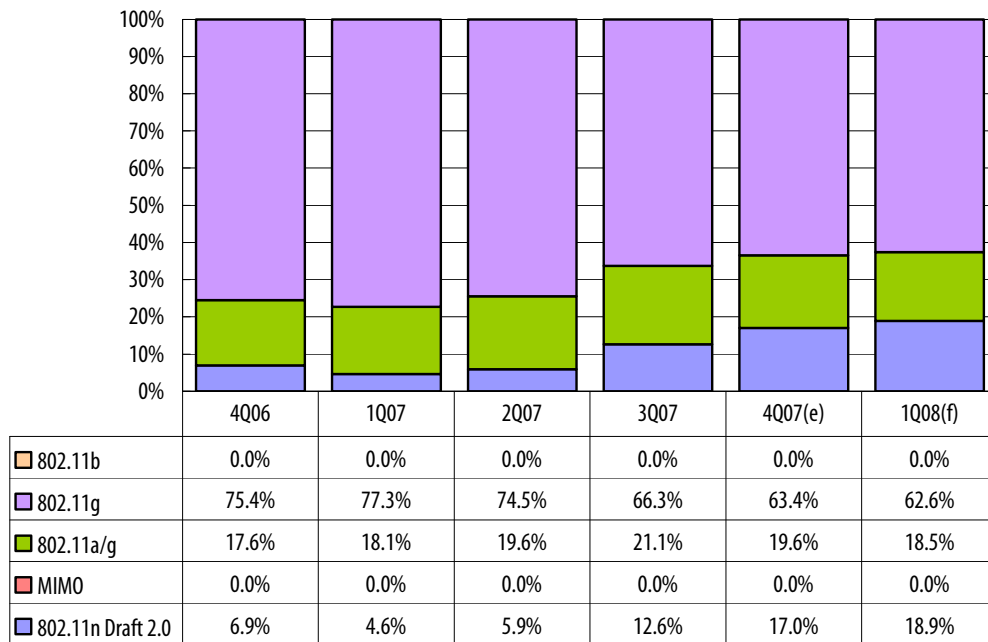
Chart 5: NIC shipment proportion by standard, 4Q06-1Q08

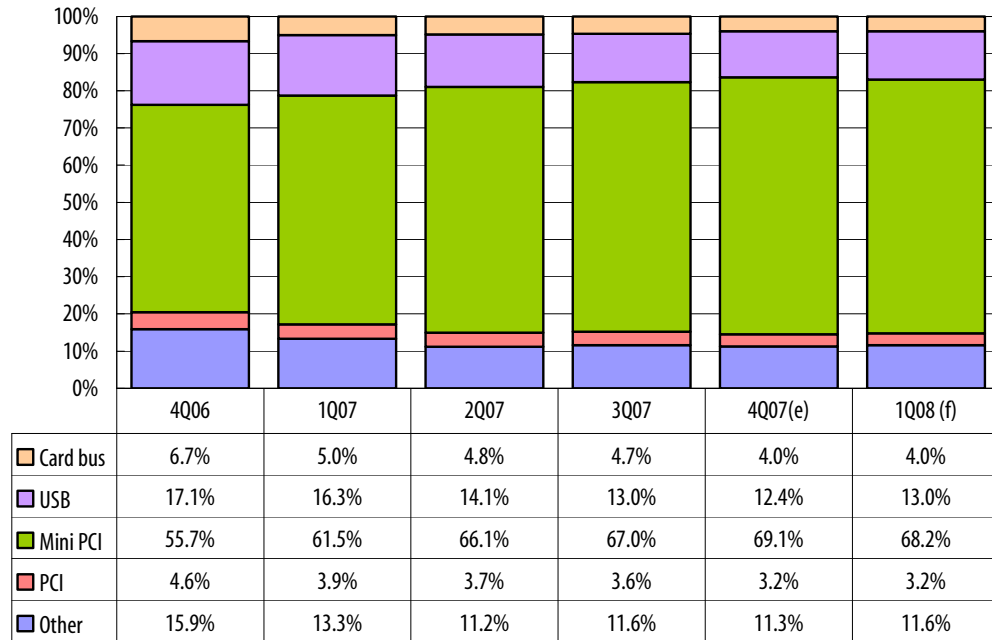|	4Q06	1Q07	2Q07	3Q07	4Q07(e)	1Q08(f)
☐ 802.11b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
☐ 802.11g	75.4%	77.3%	74.5%	66.3%	63.4%	62.6%
☐ 802.11a/g	17.6%	18.1%	19.6%	21.1%	19.6%	18.5%
☐ MIMO	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
☐ 802.11n Draft 2.0	6.9%	4.6%	5.9%	12.6%	17.0%	18.9%

Source: Digitimes Research, January 2008

The shipment volume of NICs in the draft-n standard grew by 49% on quarter in the fourth quarter of 2007 but shipment growth will slow to 5% in the first quarter of 2008. Also, amid the rising role of draft-n, 802.11g shipments were up only 6% in the fourth quarter of 2007 and shipments will drop 7% in the first quarter of 2008.

802.11a/g shipments were only 2.5% in the fourth quarter of 2007 and will drop 11% in the first quarter of 2008.

802.11g and 802.11a/g NICs shipments are expected to drop in the first quarter of 2008, so draft-n NICs shipments are expected to surpass 802.11a/g shipments for the first time.

Chart 6: NIC shipment proportion by interface type, 4Q06-1Q08

	4Q06	1Q07	2Q07	3Q07	4Q07(e)	1Q08 (f)
☐ Card bus	6.7%	5.0%	4.8%	4.7%	4.0%	4.0%
☐ USB	17.1%	16.3%	14.1%	13.0%	12.4%	13.0%
☐ Mini PCI	55.7%	61.5%	66.1%	67.0%	69.1%	68.2%
☐ PCI	4.6%	3.9%	3.7%	3.6%	3.2%	3.2%
☐ Other	15.9%	13.3%	11.2%	11.6%	11.3%	11.6%

Source: Digitimes Research, January 2008

Amid strong notebook shipments, MiniPCI shipments were up 14% in the fourth quarter of 2007, but shipments for the segment will drop 7% in the first quarter of 2008.
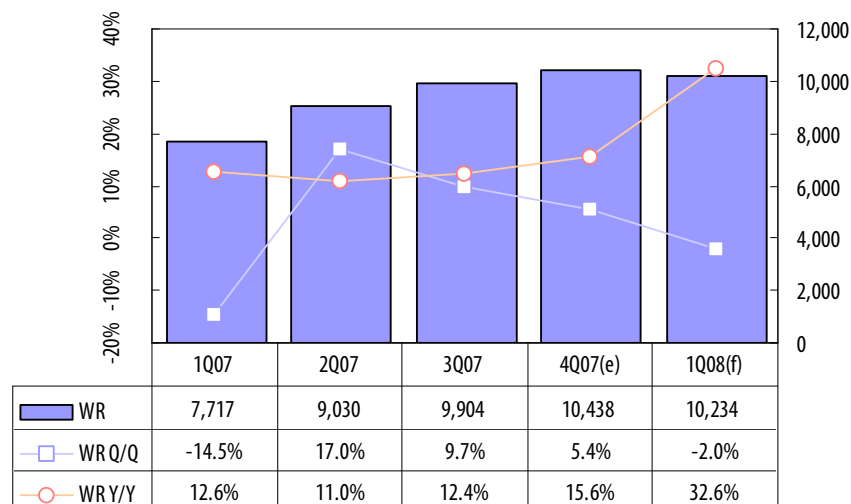
In the fourth quarter, Card bus shipments were down 6% and PCI shipments were down 2%. Shipments to both segments will continue declining in the first quarter of 2008.

USB shipments were up 5.3% in the fourth quarter of 2007 and will remain flat in the first quarter of 2008.

Most NIC interface types are subject to sequential shipment drops in the first quarter but mini PCI will be affected the most due to its dependence on the notebook market.

WR

Chart 7: WR shipments, 1Q07-1Q08 (k units)

	1Q07	2Q07	3Q07	4Q07(e)	1Q08(f)
☐ WR	7,717	9,030	9,904	10,438	10,234
☐ WR Q/Q	-14.5%	17.0%	9.7%	5.4%	-2.0%
○ WR Y/Y	12.6%	11.0%	12.4%	15.6%	32.6%

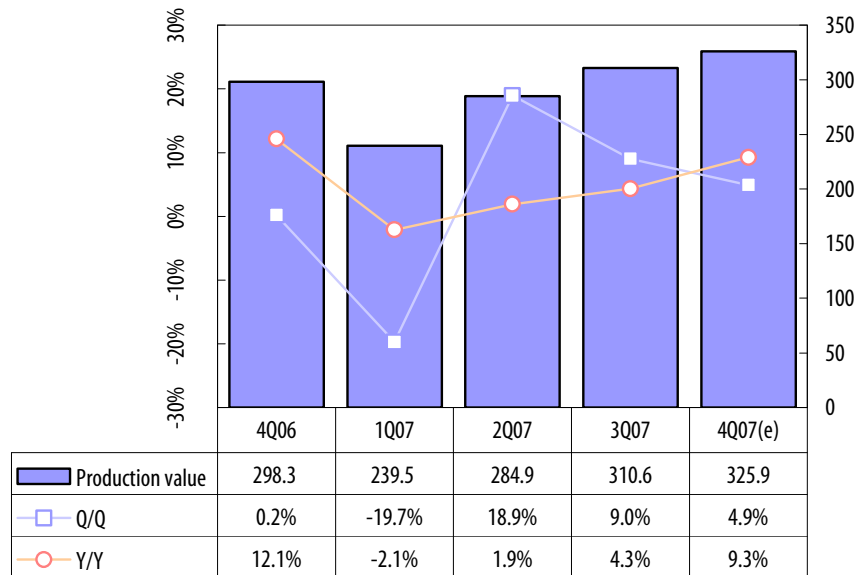*Source: Digitimes Research, January 2008*

Quarterly shipments of 10.4 million were up 5.4% sequentially, and in line with the seasonal pattern in the fourth quarter, thanks to the introduction of the draft-n standard and falling WR retail prices.

Shipments are expected to decline on a quarterly basis in the first quarter of 2008, as demand incentives will be lacking due to no meaningful retail price cut expected.

Various draft-n WRs expected to hit the market will target different pricing segments, further confusing consumers and dampening demand in the first quarter of 2008.
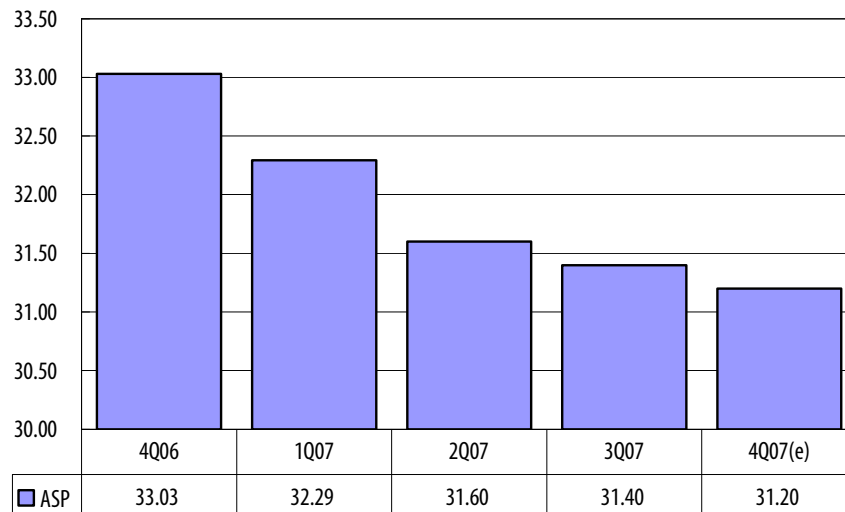
Telecom service carriers and enterprises were still mainly sourcing WRs using the 802.11g standard in the fourth quarter of 2007. Although such companies are showing interest in exploring quotes of draft- n solutions, meaningful shipments in this market are not expected to arrive until the fourth quarter of this year at the earliest.

Chart 8: WR production value, 4Q06-4Q07 (US$ million)

	4Q06	1Q07	2Q07	3Q07	4Q07(e)
Production value	298.3	239.5	284.9	310.6	325.9
Q/Q	0.2%	-19.7%	18.9%	9.0%	4.9%
Y/Y	12.1%	-2.1%	1.9%	4.3%	9.3%

Source: Digitimes Research, January 2008

Chart 9: ASP for WR, 4Q06-4Q07 (US$)

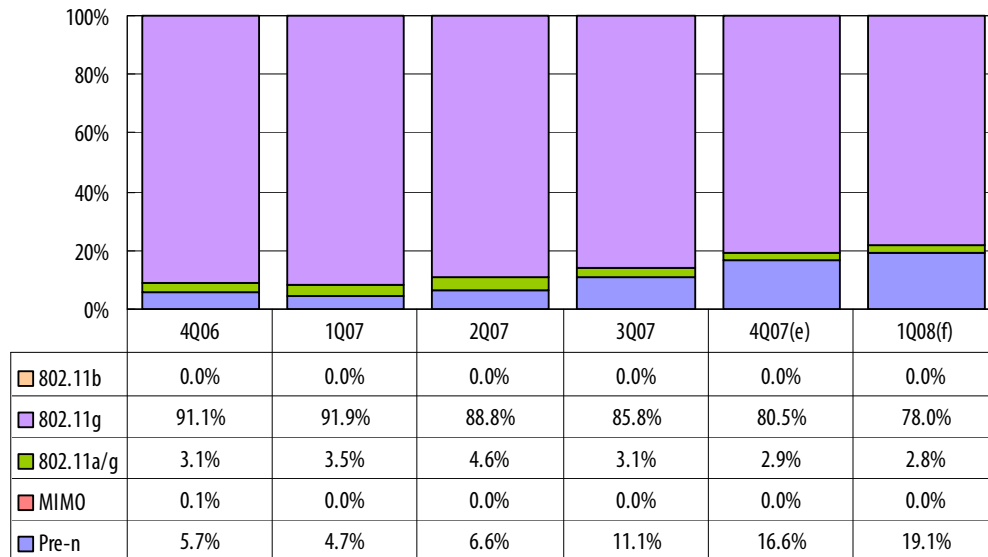|	4Q06	1Q07	2Q07	3Q07	4Q07(e)
ASP	33.03	32.29	31.60	31.40	31.20

Source: Digitimes Research, January 2008

Although chipmakers continue to lower quotes, the overall production value still posted growth of 4.9%, on shipment growth of 5.4%, as there was an increased proportion of draft-n WR shipments, which generate higher average selling prices (ASPs).

The ASP for WRs has remained stable in the second half of 2007. It fell only 0.64% in the fourth quarter after dropping 0.63% in the third quarter.

Chart 10: WR shipments by standard, 4Q06-1Q08

	4Q06	1Q07	2Q07	3Q07	4Q07(e)	1Q08(f)
☐ 802.11b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
☐ 802.11g	91.1%	91.9%	88.8%	85.8%	80.5%	78.0%
☐ 802.11a/g	3.1%	3.5%	4.6%	3.1%	2.9%	2.8%
☐ MIMO	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
☐ Pre-n	5.7%	4.7%	6.6%	11.1%	16.6%	19.1%

Source: Digitimes Research, January 2008

Although shipments in the 802.11g segment only fell 1% in the fourth quarter of 2007, it was the first time shipments to the segment fell in the fourth quarter of a year. Shipments will drop another 5% in the first quarter of 2008.

Draft-n standard shipments were up 58% in the fourth quarter of 2007 and will continue growing another 13% in the first quarter of 2008.

Shipments to the 802.11a/g segment dropped 1% in the fourth quarter and will fall another 5% in the first quarter of 2008.

The 802.11a standard is a niche market for Japan and chipmakers have no concrete plans to phase-out the development of 802.11a solutions.

The top makers

Chart 11: NIC shipments by maker, 3Q06-4Q07

	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
Top-4*	70%	72%	70%	72%	71%	75%
Top-3	65%	66%	63%	64%	62%	64%
Top-2	49%	51%	47%	51%	47%	45%
Others	30%	28%	30%	28%	29%	25%

Top-4 makers: Foxconn, Gemtek, Universal Scientific Industrial (USI) and Asustek Computer
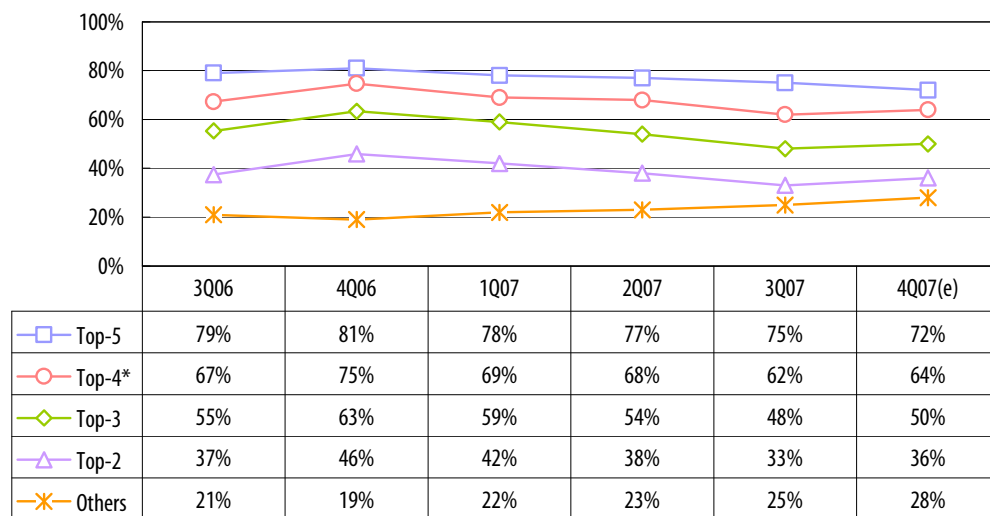*Source: Digitimes Research, January 2008*

The Top-4 makers in the fourth quarter of 2007 were Foxconn, Gemtek, Universal Scientific Industrial (USI) and Asustek Computer. Although the rankings did not change from the previous quarter, the shipment volume difference between USI and Asustek increased in the quarter.

Except for Gemtek, the other Top-4 NIC makers saw their quarterly shipments grow by more than one million units in the fourth quarter of 2007. Shipments growth at USI and Asustek was primarily driven by draft-n standard NICs.

The Top-4 makers all have strong exposure to notebook WLAN module customers. Their shipment trends are in line with seasonal trends in the notebook market.

Chart 12: WR shipments by maker, 3Q06-4Q07

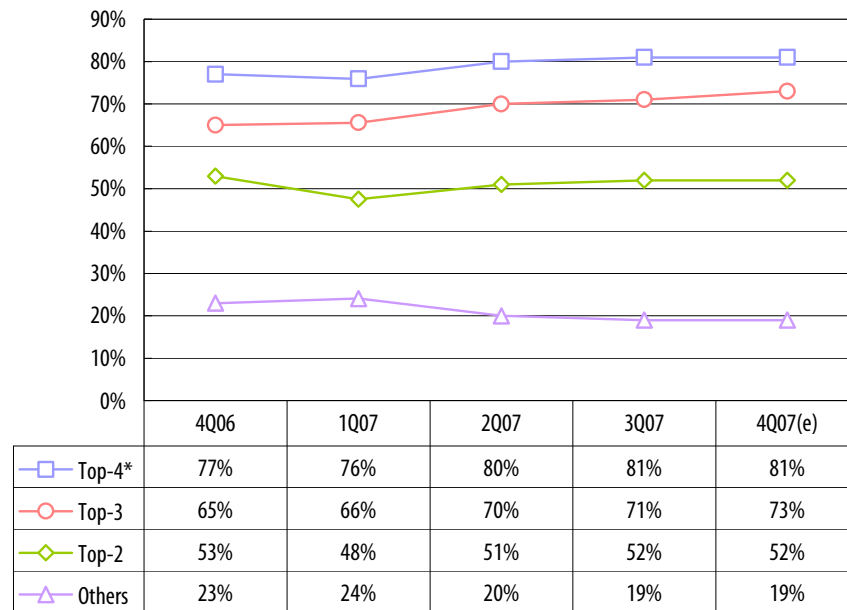|	3Q06	4Q06	1Q07	2Q07	3Q07	4Q07(e)
Top-5	79%	81%	78%	77%	75%	72%
Top-4*	67%	75%	69%	68%	62%	64%
Top-3	55%	63%	59%	54%	48%	50%
Top-2	37%	46%	42%	38%	33%	36%
Others	21%	19%	22%	23%	25%	28%

Top-4 makers: Foxconn, CyberTAN Technology, Sercomm and Arcadyan
Source: Digitimes Research, January 2008

The Top-4 makers in the fourth quarter of 2007 were Foxconn, CyberTAN Technology, Sercomm and Arcadyan. Sercomm's ranking dropped from first to third in the fourth quarter of 2007, as its customers Netgear and Linksys were relatively conservative about pricing, which in turn affected procurement at Sercomm. Belkin increased its procurement at Arcadyan, which also affected sales at Sercomm.

Although Foxconn and CyberTAN also supply Netgear and Linksys, the two makers maintained their growth from other customers in the fourth quarter.

Chart 13: Market share of WLAN chipmakers, 4Q06-4Q07

	4Q06	1Q07	2Q07	3Q07	4Q07(e)
Top-4*	77%	76%	80%	81%	81%
Top-3	65%	66%	70%	71%	73%
Top-2	53%	48%	51%	52%	52%
Others	23%	24%	20%	19%	19%

Top-4 WLAN chipmakers: Broadcom, Atheros, Intel and Marvell
Source: Digitimes Research, January 2008

The Top-4 WLAN chipmakers in the fourth quarter of 2007 were Broadcom, Atheros, Intel and Marvell. Broadcom once again topped the ranking as the largest chip supplier, after Atheros had worn the crown since the first quarter of 2007.

Broadcom regained its role by strengthening its deployment of draft-n NICs in branded notebooks, while Intel remained a Top-3 chip vendor, with its NIC chip shipments volumes outpacing Broadcom and Atheros. Thanks to shipments to game console customers, Marvell resumed its fourth place ranking.

Industry outlook for 1Q08

Since 2006, patterns show that WLAN equipment sales post declines in the first quarter of the year, and 2008 will not be an exception. As the notebook application is the key NIC sales contributor, weak notebook sales in the quarter will affect corresponding sales.

Although chipmakers may initiate price cuts during the slow season in the first quarter of 2008 in an attempt to prepare for the transition to next-generation products, channel players, which see limited room for further price cuts, may not fall in line which will discourage sales. With retail prices of WLAN equipment unlikely to drop further, meaningful sales growth is unlikely.

For general consumers, the introduction of 3.0 version of the Draft N protocol is not a deciding factor for consumption. What they care about is whether the purchased equipment has Wi-Fi certification. But for enterprise and telecom service carrier customers, they still look for mature products. When more protocols are introduced, it implies a delayed schedule for final standardization, which in turn can affect demand in this segment.

Industry watch for 2008

Shipment growth to encounter bottleneck

Given that penetration rates for built-in Wi-Fi in new notebooks is 100%, no critical jump in NIC shipments is expected, though quarterly shipments volumes will still continue trending upward.

Taiwan NIC makers will still encounter barriers when extending their presences to the handset sector, despite the fact that Wi-Fi chipmakers believe that built-in Wi-Fi in handset is an inevitable trend. Among all major NIC makers in Taiwan, only Wistron NeWeb has introduced a GSM/Wi-Fi solution.

WR shipments are only expected to maintain stable orders for telecom service carriers. Critical shipments growth in the channels is unlikely due to the high penetration rate at households and SOHOs.

NetGear and Linksys only had their quarterly sales grew by a single digit in the fourth quarter of 2007, implying that a sales catalyst is lacking for wireless Internet service providers (WISPs)

802.11a/g shipments to maintain stable

Shipments of 802.11a/g WLAN equipment were stable in 2007 and the stability will persist throughout 2008. The 802.11a/g standard found its markets niches in the Japan market, enterprise segment and multimedia content transmission segment. By supporting a frequency of 5GHz, transmission is cleaner than at 2.4GHz.
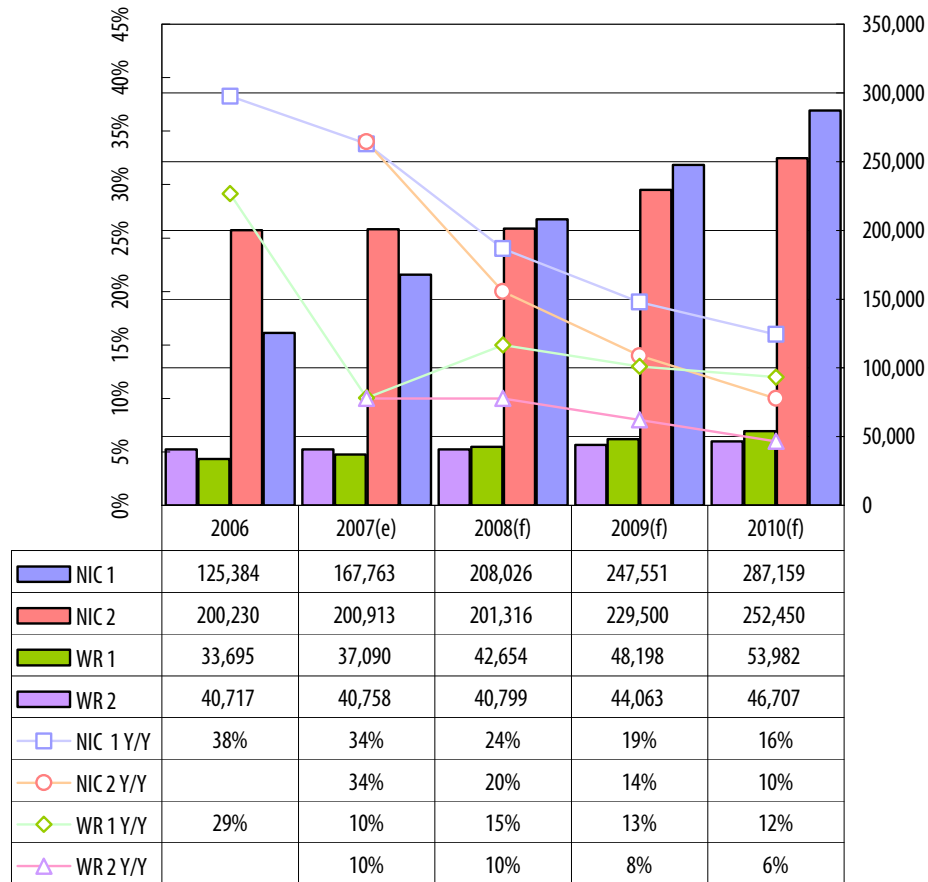
Chipmakers are expected to continue with their 802.11a/g product lineups over the next 2-3 years with the sales proportion to remain stable each quarter.

Still, competition between 802.11g and draft-n will intensify. Chipmakers plan to start replacing 802.11g WRs with entry-level draft-n products from the third quarter of this year. And the price gap between 802.11g and draft-n WLAN equipment will narrow from the third quarter.

By the end of the year, the penetration rate of WRs based on the draft-n standard is expected to hit 30%.

Industry outlook through 2010

Chart 14: WLAN equipment shipments, 2006-2010 (k units)

	2006	2007(e)	2008(f)	2009(f)	2010(f)
NIC 1	125,384	167,763	208,026	247,551	287,159
NIC 2	200,230	200,913	201,316	229,500	252,450
WR 1	33,695	37,090	42,654	48,198	53,982
WR 2	40,717	40,758	40,799	44,063	46,707
NIC 1 Y/Y	38%	34%	24%	19%	16%
NIC 2 Y/Y		34%	20%	14%	10%
WR 1 Y/Y	29%	10%	15%	13%	12%
WR 2 Y/Y		10%	10%	8%	6%

1: Positive forecast; 2: conservative forecast; Source: Digitimes Research, January 2008

Some available draft-n applications that feature cheaper prices also feature poorer performance. But with consumers having a difficult time telling the differences between various products without examining specification details, there definitely exists the possibility that distrust and confusion can arise in the market, discouraging consumption.

In addition, the projected penetration of FemtoCell and unlicensed mobile access (UMA) may affect WR shipments in the future. If FemtoCell base stations can integrate Wi-Fi connectivity as an integrated access device (IAD), it will affect WR sales. And the penetration rate of UMA handsets will also directly affect the procurement of WRs by telecom service providers.

The data transmission rate that draft-n standard supports can help grow the digital home concept through the sales of corresponding WRs and digital media adapters (DMAs). However, as the final standard is not yet available, this will affect WR sales and the ability for WRs to be a key influence in home networking.

Therefore Digitimes Research has made two shipment forecasts; one based on quicker adoption rates of next-generation technology and another more conservative forecast.

In the future, Taiwan chipmakers will look to play an increasing role in the industry. Taiwan WLAN chip vendors no longer only compete in terms of cost. Their solutions are price-friendly with strong functionality, prompting more vendors to adopt Taiwan chip vendors' solution in new products. However, while most Taiwan chip vendors are increasing their exposure in the NIC market, they still need to spend extra effort in the WR sector.