

Home Networking Semiconductor Vendors, MoCa, HomePlug, HomePNA, G.hn CA-1099

Competitive Assessment Introduction

This competitive analysis evaluates the home networking market with an emphasis on no-new (existing) wire technologies (G.hn, HomePlug, HomePNA, MoCA). Today's connected home, however, leverages a strong mix of wired and wireless technologies; the advent of multiple input multiple output (MIMO) variants of Wi-Fi and 5 GHz wireless technologies (with higher bandwidth, yet shorter range capabilities) and the increasing prevalence of tablets and video viewing devices, makes wireless technology also critical in the connected home. Therefore, while the primary focus of this assessment is no-new wire technologies, significant weight is given to wireless (notably, Wi-Fi) and hybrid networking technologies including IEEE P.1905. The report is divided into two principal parts: a market share analysis and a vendor matrix. Market shares, based on total nodes shipped by a vendor of all technologies, are considered in the last complete calendar year (2011). The vendor matrix evaluated the companies across two general categories, innovation and implementation. Five companies were evaluated: Broadcom, Entropic, MStar Semiconductor, Qualcomm Atheros (QCA), and Sigma Designs.

Vendor Matrix: Home Networking Semiconductor

Rankings

After individual scores are established for Innovation and Implementation using the above criteria, an overall company score is established using the Root Mean Square (RMS) method:

$$\text{Score} = \sqrt{\frac{\text{innovation}^2 + \text{implementation}^2}{2}}$$

The resulting overall scores are then ranked and used for percentile comparisons.

The RMS method, in comparison with a straight summation or average of individual innovation and implementation values, rewards companies for standout performance.

For example, using this method a company with an innovation score of 9 and an implementation score of 1 would score considerably higher than a company with a score of 5 in both areas, despite the mean score being the same. ABI Research believes this is appropriate as the goal of these matrices is to highlight those companies that stand out from the others.

Overview

This vendor matrix analyzes the wired home networking market, with strong consideration given to hybrid wireless/wired solutions. Current year analysis looks at 2011, the last complete year of market share data and 2012 for new product innovations. Forward looking analysis primarily considers integrated and hybrid networking solutions, although current market status also played a role.

Five companies were considered for this vendor matrix analysis: Broadcom, Entropic, QCA, Sigma Designs, and SPiDCOM/ MStar (MStar). Broadcom finished first overall and in both the innovation and implementation categories. Broadcom has the widest presence in the wired (MoCA and HomePlug) and wireless networking markets and is well positioned to lead the hybrid networking space.

QCA finished second overall (tied for second in implementation and in innovation) due to its strong HomePlug share and proactive work in the hybrid and next-generation networking technologies (AV2). MStar (with HomePlug shipments and newer MoCA implementations) finished third, due in large part to its second place innovation score.

Entropic (once the sole source of MoCA, but now often second source and licensor of MoCA designs, trying to move into the STB realm) and Sigma Designs (strong HomePNA vendor with some HomePlug designs and banking heavily on G.hn) finished fourth and last, respectively. Entropic tied for second in the implementation score, but finished last in innovation. Sigma Designs finished last in implementation and fourth in innovation.

Unfortunately, we were unable to reliably estimate unit shipments for STMicro for MoCA chipsets (integrated with some of their latest generation STB chips) or their powerline networking chips (which are primarily used in home automation/control/monitoring and other low data rate, low power applications, rather than connected home).

Marvell is an active player in these markets, but the company did not operate in wired networking technologies covered/active in 2011 (UPA Powerline or G.hn, respectively), so it was not included in this analysis. Marvell does operate in the Wi-Fi market and is ranked roughly on par with MediaTek/MStar/Ralink. Marvell will certainly be a market contributor and factor as G.hn deploys – at which time Marvell will be added in future competitive analyses that cover these markets.

Ranking criteria is divided into two categories: implementation and innovation, each with various items and weighting.

Implementation (total possible score = 100):

- **Current Landscape:** This segment considers current market shares (2011) and market conditions (e.g., overall node shipments). Points assigned: up to 30.
Points were assigned based on node shipments (by technology) for 2011. In 2011, HomePlug, Coax, HomePNA, and G.hn accounted for 44.5%, 41.3%, 14.2%, and 0% of wired networking nodes in 2011. Each company's respective market share (by technology) was multiplied by the overall technology share. This product was then divided by the max score and then multiplied by 30.

Broadcom's score, for example, was calculated as follows: $((\text{Broadcom MoCA Share} \times \text{Total MoCA share}) + (\text{Broadcom HomePlug Share} \times \text{Total HomePlug share})) / (\text{max company scores}) \times 30 = \text{Current Landscape Score}$.
- **Future Landscape:** This segment considers future market prospects by technology (forecasted node shipments for each technology) and market presence for each respective company (wired networking). It is designed to capture a company's future sellable addressable market (SAM) for 2013 and the duration of the forecasting period (to 2018).
- Points were assigned based on expected market presence and the cumulative node forecast by technology. Each company was assigned a binary score (1 for technology present/supported, 0 for no presence) for each technology and then these values were multiplied by the market shares of the cumulative node shipments. The resulting share/presence of the company was finally multiplied by 30.
- Broadcom's score was calculated as follows: $(1 (\text{Total MoCA Share}) + 1 (\text{Total HomePlug Share}) + 0 (\text{Total HomePNA Share}) + 0 (\text{Total G.hn Share})) \times 30 = \text{Future Landscape Score}$.
- The implementation part of the hybrid networking score used both the current landscape scores, Wi-Fi market shares, and a hybrid adder for current products on the market.
- **Hybrid Networking:** This segment considers the players' position in the wired and wireless networking market (focus on current products and market positions). This score captures leadership in IEEE 1905.1, chipsets, and/or reference designs that successfully implement hybrid networking technologies and innovation within higher layers of the connected home protocol stack (i.e., QCA's Skifta); 40 points.

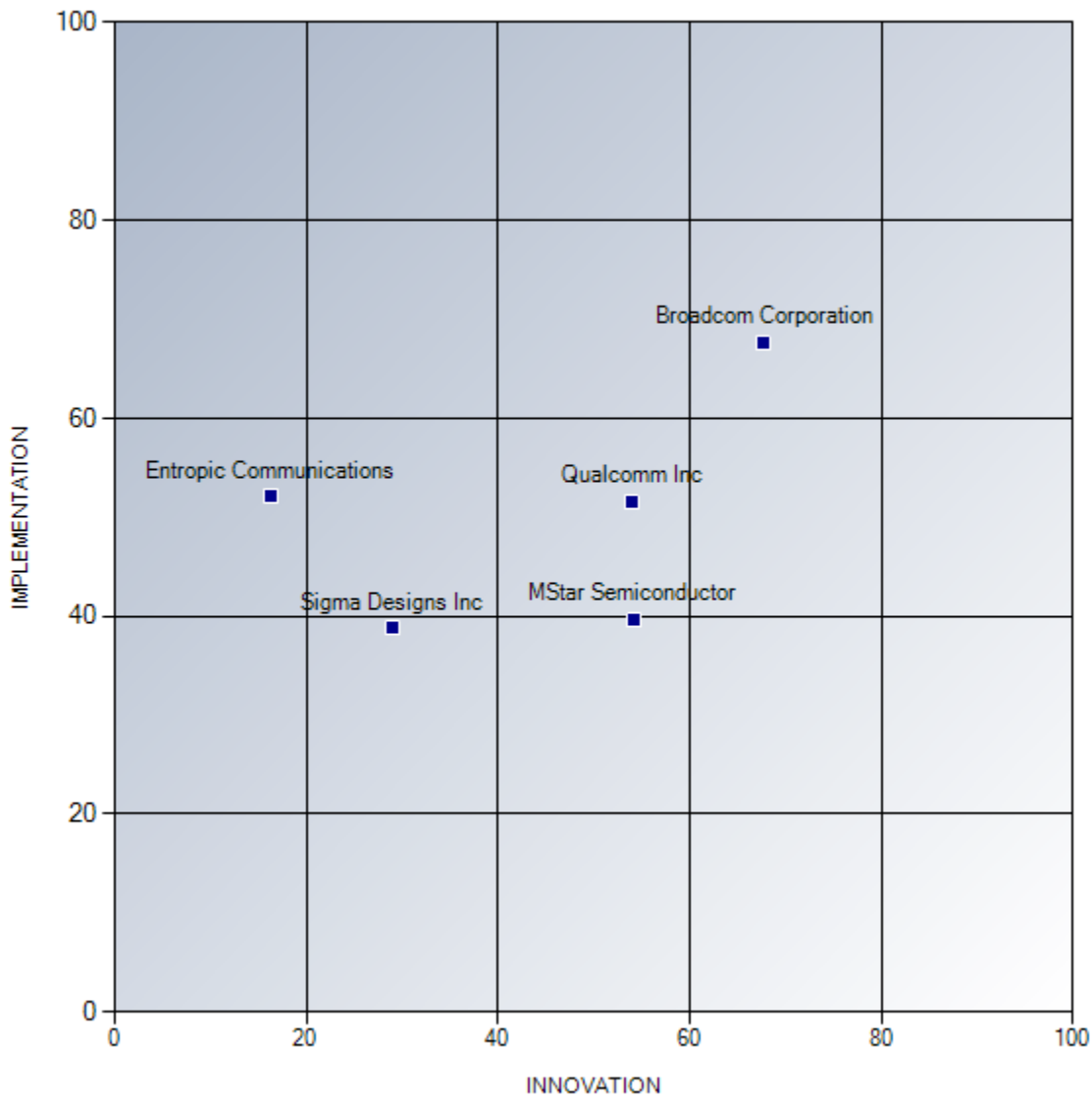
Innovation (total possible score = 100):

- **Hybrid Networking:** This segment considers the players' position in the wired and wireless networking market (focus on future products and market positions).
Because wireless networking is a critical element to the hybrid networking market (most pay TV operators have not demanded hybrid wired networking solutions to date), Wi-Fi solutions were given an equal weighting to wired networking products. In this case, a score of 5 was assigned to companies that operate in the Wi-Fi market. The rest of the wired network technologies were valued at up to 5 points. The forecasted market shares (nodes) were multiplied by 5 and assigned to companies who supply/are expected to supply products. In total, a company supplying Wi-Fi solutions and operating in all four wired networking technologies would receive 10 points. These scores were then divided by 10 and multiplied by 50 to arrive at the hybrid networking score.
- **Product Portfolio:** The Product Portfolio score considered current/active hybrid wireless products, presence in the IC market for STBs, and other consumer electronics (CE), broadband customer-premise equipment (CPE), hybrid wired solutions, and a Wildcard score.
Companies were awarded points in five categories: hybrid wireless products (7), STB/CE SoC (7), consumer broadband CPE (5), hybrid wired products (2.5), and wildcard (2). The Wildcard score was awarded to only one company that had a key differentiator. All points were awarded on an all-or-nothing basis, save for the STB/CE category, which was more competitive – points were assigned based on market presence and available products.

The sum total of these products was then scaled to 50 to arrive at the product portfolio score.

Vendor Matrix Results

Company	Overall Ranking	
	Score	Rank
Broadcom Corporation	67.7	1
Qualcomm Inc	52.8	2
MStar Semiconductor	47.5	3
Entropic Communications	38.6	4
Sigma Designs Inc	34.3	5



Market Share: Home Networking Semiconductor

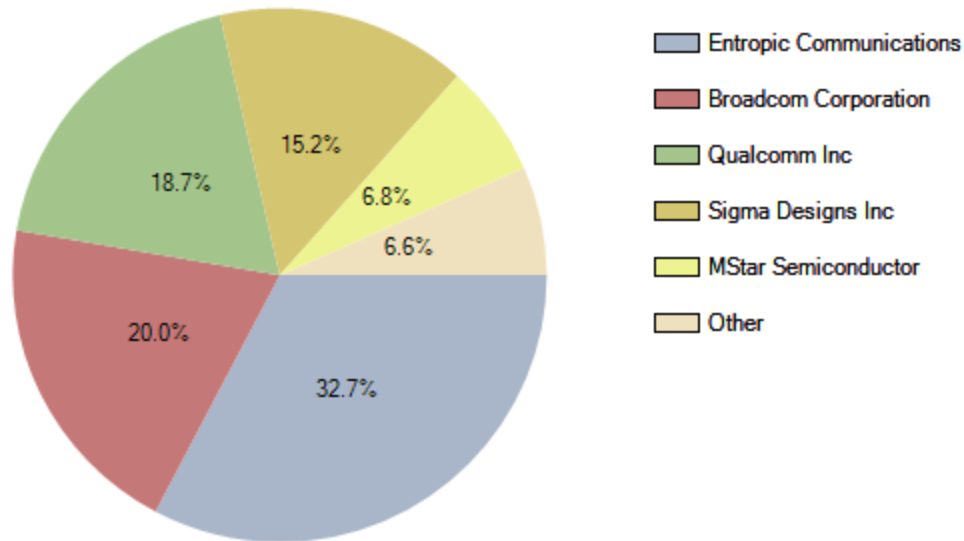
This market share analysis covers the “no new wires” home networking market for calendar year 2011. This analysis considers five companies: Broadcom, Entropic, QCA, Sigma Designs, and MStar. Companies were ranked based on node shipments (within the HomePlug, HomePNA, MoCA markets) – note: market shares were calculated by aggregating all nodes across technologies, while the vendor matrix portion of this analysis evaluated each company based on its position within each respective market. While a significant player, we could not reliably estimate unit shipments for STMicroelectronics’ home networking chipsets (or STB chipsets that include home networking features).

In 2011, despite only operating in one market (MoCA), Entropic led this field of companies in node shipments. MoCA continues to have a strong presence in the North American market with top operators across all pay TV markets (cable, satellite, and telco). Broadcom also has a growing presence in the MoCA market and, in some respects, is ahead of Entropic with integrated/combo solutions (both STB SoC and broadband CPE). Broadcom captured the second position with both its MoCA and HomePlug operations.

QCA only operates in the HomePlug market, but still secured the third position close behind Broadcom due to its market leading presence in the powerline space. Sigma Designs came in fourth operating in the HomePNA, HomePlug, and G.hn (G.hn played no role in 2011). MStar came in last for market share, but is a relative newcomer in the MoCA market (joined the MoCA Alliance as an Associate Member in August 2012) and joined the HomePlug market through its acquisition of SPiDCOM (joined HomePlug Powerline Alliance in March 2012) – the company’s market share is based on SPiDCOM for 2011.

Market Share Results

Company	Overall	
	Market Size (Nodes)	Share
Entropic Communications	21	32.7%
Broadcom Corporation	12.8	20%
Qualcomm Inc	12	18.7%
Sigma Designs Inc	9.8	15.2%
MStar Semiconductor	4.4	6.8%
Other	4.3	6.6%
Total	64.3	100%



Individual Company Assessments

Broadcom Corporation

Vendor Matrix: Home Networking Semiconductor

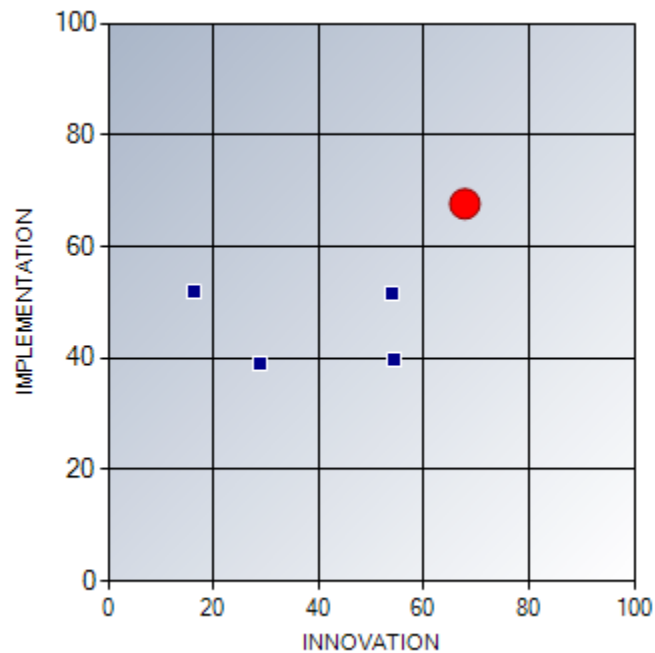
Summary

Innovation: 67.73

Implementation: 67.68

Overall: 67.7

Rank: 1



In the final rankings, Broadcom finished first overall – placing first in both the implementation and innovation categories.

Implementation:

- Current Landscape Score: 18/30
- Future Landscape Score: 24/30
- Hybrid Networking Score: 25/40

Broadcom operates in the two largest wired networking markets (MoCA and HomePlug), but scored below Entropic for current landscape due to market share. Broadcom is in a strong position to increase its share in at least the MoCA market due to its lead in integrated STB and broadband CPE solutions. Broadcom also has strong future prospects due to its presence in STB/BB IC markets, Wi-Fi, and wired networking; allowing the company to take advantage of integrated and hybrid solutions, which are expected to play an increasingly important role as these markets mature. Broadcom was the Wi-Fi IC market leader, which greatly helped Broadcom in the hybrid networking score. While other companies like QCA have also been active in the 802.11ac space, Broadcom has taken a more consumer-friendly approach by branding ac as “5G Wi-Fi,” which should resonate more with consumers (who are often unknowledgeable about their Wi-Fi technology) and could increase mindshare for hybrid products as well.

Innovation:

- Hybrid Networking Score: 45/50
- Product Portfolio Score: 23/50

Broadcom again scored well in the hybrid networking score component of the innovation category and took top score in the product portfolio category. As previously mentioned, Broadcom operates in many of the key markets that will contribute to the maturation of the wired networking market (e.g., integrated and hybrid solutions). Broadcom's broadband CPE solutions, in particular, are a key differentiator among the competitive field.

Market Share: Home Networking Semiconductor

Market Share: 20%

Broadcom operates in the MoCA and HomePlug markets and captured the second position in this market share ranking. Broadcom offers integrated MoCA solutions (e.g., STB and BB CPE), which helps differentiate its products and positions it well when targeting service providers – where the majority of MoCA sales have occurred to date.

In the HomePlug market, Broadcom finished second behind QCA and, like the other market leaders, is preparing to begin the transition to AV2 products. Broadcom, however, has not been as vocal about hybrid wireless/wired networking solutions; although the company is working on these solutions and is actively involved in IEEE 1905.

Broadcom is on a good trajectory to capture the top position, particularly as the market matures. Broadcom's top position in the Wi-Fi market (discrete and combo solutions) also affords the company an advantage as hybrid networking increasingly becomes more commonplace.

Entropic Communications

Vendor Matrix: Home Networking Semiconductor

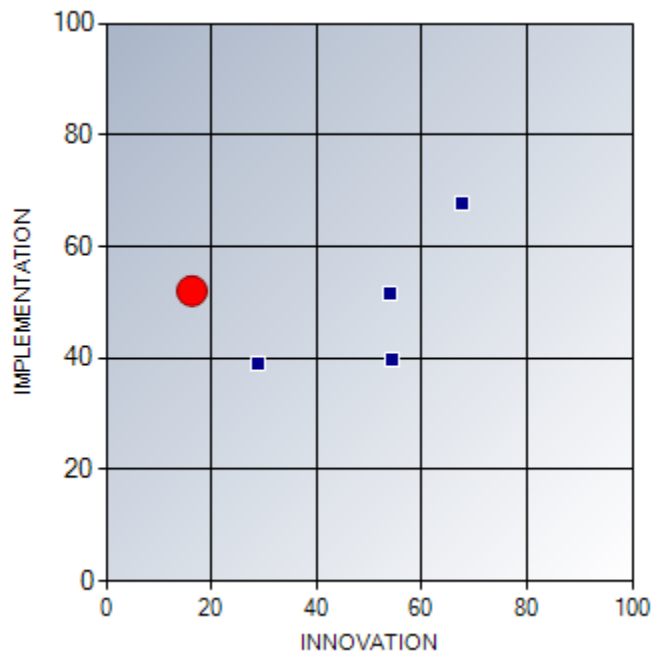
Summary

Innovation: 16.25

Implementation: 52.06

Overall: 38.6

Rank: 4



Entropic finished fourth overall – tying for second in implementation and last/fifth for innovation.

Implementation:

- Current Landscape Score: 30/30
- Future Landscape Score: 12/30
- Hybrid Networking Score: 10/40

In 2011, Entropic shipped the largest number of nodes and, therefore, received a perfect current landscape score. Due to Entropic's relatively focused market presence (MoCA), the company scored lower future and hybrid networking scores. Broadcom, QCA, and MStar/MediaTek all operate in the Wi-Fi market, which put Entropic at a decided disadvantage in the hybrid and, by relation, future prospects segments. However, Entropic should take advantage of its Trident Microsystems acquisition and release integrated solutions for the STB market.

Innovation:

- Hybrid Networking Score: 10/50
- Product Portfolio Score: 6/50

Without a wireless networking presence, Entropic scored lower in the hybrid and product portfolio categories. Integrated solutions helped Entropic, but it was not enough to score well in the product portfolio category, since all of the other competitors (except for QCA) currently operate in the STB/CE IC market(s).

Market Share: Home Networking Semiconductor

Market Share: 32.7%

Entropic finished first in this market share analysis due to the company's strong position in the MoCA market. MoCA has solid growth prospects, particular as the technology extends beyond the core North American market – Europe and Latin America are the next target markets, although Asia-Pacific will play a role as well.

To better compete against Broadcom and the newer MoCA entrants, Entropic will have to leverage its Trident Microsystems acquisition. Integrated solutions are on the development roadmap and should bring Entropic closer to parity with the growing competitive field – as the first mover, this disadvantage was less significant.

Entropic will potentially have a disadvantage in the hybrid networking market without an active presence in the wireless networking space.

MStar Semiconductor

Vendor Matrix: Home Networking Semiconductor

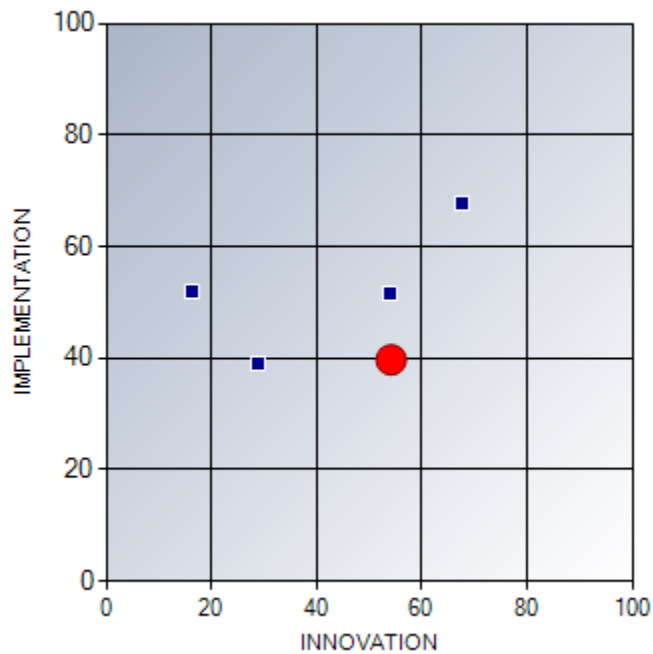
Summary

Innovation: 54.12

Implementation: 39.71

Overall: 47.5

Rank: 3



MStar ranked third overall – finishing fourth in the implementation category and second in innovation.

Implementation:

- Current Landscape Score: 6/30
- Future Landscape Score: 24/30
- Hybrid Networking Score: 9/40

MStar scored low in the current landscape segment due to its nascent start in MoCA (not present in 2011) and lower share in HomePlug. However, the company has solid future opportunities due to its work in the Wi-Fi and STB/CE markets – with hybrid and integrated solutions. MStar scored lower in the hybrid networking category for implementation due to its lower market shares.

Innovation:

- Hybrid Networking Score: 45/50
- Product Portfolio Score: 9/50

MStar matched Broadcom for its innovation hybrid networking score by operating in the same markets (Wi-Fi, MoCA, HomePlug). MStar through its SPiDCOM Technologies acquisition is also an active player in the IEEE P1905 standard, along with Broadcom and QCA. MStar, however, scored lower for its product portfolio since current support is closer to Entropic – *i.e.*, no hybrid solutions or potential for STB/CE products (MStar also has a stronger focus in CE than STB, which is currently not factor in the earlier stages of the wired networking market(s)).

Market Share: Home Networking Semiconductor

Market Share: 6.8%

MStar is a new entrant to the MoCA market and had no presence in 2011, while through its acquisition of SPiDCOM, it captured the third position in the HomePlug market, but finished last in this analysis (fifth). Despite its initially smaller share, MStar/MediaTek has the potential to compete with the larger operators like Broadcom and QCA. To increase its share, hybrid wired/wireless solutions will be important and MStar needs to play a more active role in this facet of the market.

Qualcomm Inc

Vendor Matrix: Home Networking Semiconductor

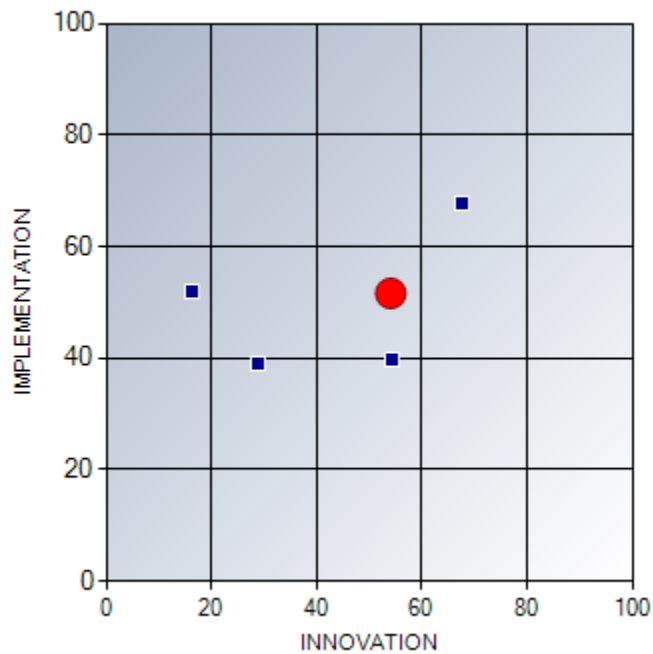
Summary

Innovation: 54.03

Implementation: 51.63

Overall: 52.8

Rank: 2



QCA finished second overall – finishing tied for second in the implementation category and third in innovation.

Implementation:

- Current Landscape Score: 17/30
- Future Landscape Score: 12/30
- Hybrid Networking Score: 22/40

QCA scored well in the current landscape due to its leading share in the HomePlug market, but scored lower in the future wired networking landscape due to its sole focus on powerline technology with no Coax/MoCA or G.hn solutions in its portfolio (in reference to no-new wires technologies). QCA, like Broadcom, however, scored well in hybrid networking for its strong share in the Wi-Fi market, along with market leading hybrid products available in the market today.

Innovation:

- Hybrid Networking Score: 35/50
- Product Portfolio Score: 19/50

QCA scored well in the innovation category, but came in behind Broadcom and MStar because its networking portfolio was less diverse; QCA's Wi-Fi solutions and, more importantly, its hybrid products helped its product portfolio score. QCA was also awarded the wildcard points in this category due to its market-leading hybrid solutions and AV2 products.

Market Share: Home Networking Semiconductor

Market Share: 18.7%

QCA operates in the HomePlug (powerline) market and secured the third overall position in this market share analysis – it finished first in the HomePlug Market (2011). Qualcomm was first, if not among the first, to introduce AV2 products, although with speeds close to AV solutions currently on the market, this is more of a transitional step toward AV2 interoperability.

QCA, like Broadcom, is also a key player in the wireless (Wi-Fi) market and is currently a leader in hybrid home networking (wired/wireless). QCA is expected to continue trailblazing the hybrid market, which is expected to play a more significant role in coming years.

QCA could compete with the top networking IC companies, but without integrated multimedia solutions, this could put the company at a disadvantage when compared to Broadcom, MStar, Sigma Designs, and soon Entropic.

Sigma Designs Inc

Vendor Matrix: Home Networking Semiconductor

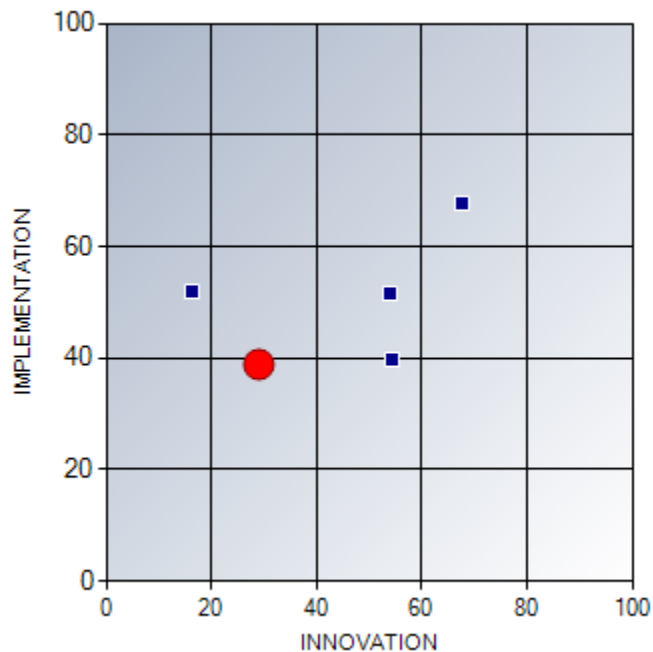
Summary

Innovation: 28.96

Implementation: 38.89

Overall: 34.3

Rank: 5



Sigma Designs finished last (fifth) in this analysis – ranking last in implementation and second to last (4th) in innovation.

Implementation:

- Current Landscape Score: 16/30
- Future Landscape Score: 18/30
- Hybrid Networking Score: 5/40

Sigma Designs has a relatively wide breadth of products, but the company either is not present (e.g., MoCA) or is not a key player (e.g., HomePlug) in the most significant wired networking markets (those in play in 2011 and 2012). In addition, Sigma Designs is not active in the Wi-Fi market, which leaves off a critical element of the hybrid networking market. For this reason, Sigma Designs was assigned the lowest score in the hybrid networking category.

Sigma Designs does, however, control the HomePNA market and, aside from an unnamed Asia-Pacific operator (assumed to be very small), is the sole supplier of HPNA ICs. Sigma Designs has also been a key supporter of G.hn, but the technology is facing significant hurdles – MoCA and HomePlug, for instance, have already established significant shares in North America (cable, DBS, telco) and Western Europe (telco), respectively. More troubling for G.hn has been the relatively low demand for hybrid wired networking solutions, a feature that separated G.hn. Higher initial cost will also serve as a hurdle in the early stages of deployment. HomePNA still has growth opportunity (e.g., Latin America), but momentum is stronger behind MoCA and HomePlug.

Innovation:

- Hybrid Networking Score: 15/50
- Product Portfolio Score: 14/50

While Sigma Designs scored at the bottom for hybrid networking in the implementation category, the company scored slightly better in the innovation segment, placing fourth ahead of Entropic. In the implementation category, Entropic received additional weight for its strong presence in the MoCA market, which will play a significant role in the hybrid market. In the innovation category, however, market shares did not play a role as this part of the analysis was more forward looking – this allowed Sigma Designs to score higher due to its presence in HomePlug, HomePNA, and G.hn compared to MoCA for Entropic.

Sigma Designs also scored relatively well for product portfolio due to its presence in STB/CE markets, but this was not enough to counter the more limited hybrid opportunities and either limited share or lack of presence in wired networking technologies with more momentum.

Market Share: Home Networking Semiconductor

Market Share: 15.2%

Sigma Designs finished fourth in this market share analysis, operating in the HomePNA, HomePlug, and G.hn markets. Currently, Sigma Designs is the primary supplier of HomePNA silicon, although reports suggest an unnamed company in Asia-Pacific is also supplying silicon – for the purposes of this analysis, Sigma Designs was assumed to be the sole supplier (which by volume is likely true to the market).

Sigma Designs has a smaller presence in the HomePlug market compared to the other three companies discussed in this analysis. The company had placed significant emphasis on G.hn, but the market for the technology has developed slower than many anticipated, in addition, there is the question of whether pay TV operators will demand hybrid wired networking solutions (e.g., supporting Coax and powerline).

Sigma Designs is in a precarious position as G.hn is behind the wired networking curve, with higher priced solutions and a minimal to zero installed base. Questions also exist as to whether companies will transition from HomePNA to G.hn as some had presumed – hybrid solutions with Wi-Fi and HomePNA could adequately serve pay TV operators who were considering G.hn (with a greater reliance on Wi-Fi with HomePNA as the backup networking technology).