

A Guide to Mobile TV Chips

First Edition

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Authors: Joseph Byrne and Linley Gwennap

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Your Guide to Mobile TV Chips

As mobile TV emerges as a viable form of portable entertainment, it is untethering consumers from their living rooms. Mobile-TV receivers are being designed into handsets, media players, navigation systems, and PCs. The prospect of integrating mobile-TV receivers into these devices opens the total available market for the chips to 100 million units within a few years. This opportunity has lured more than a score of suppliers into the market.

This transition has been facilitated by the development of new digital specifications to improve receiver performance and reduce power consumption. Despite these advances, the market remains chaotic. Different broadcasters use different specifications and, to date, no single specification has been adopted as a worldwide standard. Deployment plans vary because of spectrum availability and other issues, while different business models are being attempted. Japan and Korea have seen rapid uptake of their 1Seg and T-DMB services that are available at no charge and carry well-known shows. Fee-based services and those with limited content have taken off more slowly.

We Sort Out the Technology and the Key Vendors

"A Guide to Mobile TV Chips" provides in-depth coverage of TV receivers from suppliers such as DiBcom, Siano, Texas Instruments, Analog Devices (Integrant), Telegent, and Afa Technologies. The report explains the plethora of standards, such as DVB-H, ISDB-T 1Set, T-DMB, and MediaFLO, clarifying their differences and explaining the common technologies behind them. It also discusses the design of receiver chips and outlines future trends. The report analyzes the market opportunity for mobile TV ICs, discussing the inhibitors and accelerators of adoption.

Make Informed Decisions

Joseph Byrne, coauthor of three previous reports on wireless ICs, teams up with coauthor Linley Gwennap to deliver a comprehensive look at the emerging mobile TV market. Our unique technology and business analysis helps you zero in on the right mobile TV chips for handsets, portable media players, PCs, and other mobile systems. Whether you are looking for an innovative design solution, a vendor to partner with, or a rising company to invest in, this report will cut your research time and save you money.



This report complements our "Guide to Wireless Handset Processors" and "Guide to Wi-Fi/Bluetooth Connectivity Chips" by covering by covering a technology that is becoming integrated with handsets and other mobile systems. Accelerate your learning. Order "A Guide to Mobile TV Chips" today.

This report is written for:

- Engineers who need to select a supplier of TV chips for use in the handsets, media players, navigation systems, or other mobile systems they are designing
- Marketing and engineering staff at companies that sell mobile-TV chips or products that work with these chips
- Technology professionals who wish an introduction to mobile TV
- Financial analysts who desire a detailed analysis and comparison of mobile-TV chip suppliers and their chances of success
- Press and public relations professionals who need to get up to speed on this emerging technology

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The following excerpt is from "***A Guide to Mobile TV Chips, First Edition.***"

This PDF contains the complete table of contents, list of figures, list of tables, preface, and executive summary. The full report may be purchased from The Linley Group.

A Guide to Mobile TV Chips

First Edition

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By Joseph Byrne and Linley Gwennap



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About the Authors

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Joseph Byrne is a senior analyst at The Linley Group. With more than 15 years of industry experience, he is one of the industry's leading analysts covering the semiconductor market. He has published numerous reports analyzing various segments of the industry and is the coauthor of several reports, including *A Guide to SOHO Gateway Processors* and *A Guide to Access Processors*. Joe has spoken at investor forums and industry conferences, including Communication Design Conference, Network System Design Conference, Gartner Semiconductor Conference, Selby Venture Partners' LP Conference, and the BusinessWeek IT Symposium at Comdex. He is frequently quoted in both technical and business publications, including *EE Times*, *Unstrung*, *Electronic Business*, the *San Jose Mercury News*, and the wire services.

Before joining The Linley Group, Joe served as a principal analyst for semiconductors at Gartner Research. In this role, he was responsible for tracking technology trends and market size, preparing market forecasts, and assessing the competitive landscape. His expertise also includes evaluating business and strategic plans, advising startups and major IC suppliers on marketing and positioning strategies, and providing insight to VCs and investment banks to support investment decisions.

Joe led Gartner's coverage of networking semiconductors in the era of the telecom boom and bust. Thereafter, he led Gartner's coverage of computing semiconductors, including microprocessors, system-logic chip sets, and graphics processors. Through both eras, he led coverage of wireless LAN chip sets. Joe also authored Gartner's seminal report on digital-camera technology, and he covered embedded microprocessors in the late 1990s. Before serving as an analyst, Joe held consulting positions with Gartner, Deloitte Consulting, and smaller firms in the U.S. and Europe.

He began his career as a microprocessor designer for SMOS Systems, where he honed his technical skills as a principal engineer. He earned a bachelor of science degree in electrical engineering and computer science from Duke University and an MBA from the University of Michigan.

Linley Gwennap



Founder and principal analyst of The Linley Group, Linley Gwennap is one of the most respected analysts in the microprocessor industry. He has followed the industry for more than 10 years. A prolific writer, Linley has published hundreds of articles in a variety of publications including *EE Times*, *Upside Magazine*, *Electronic Business*, *Nikkei Electronics*, and the *San Jose Mercury News*. His work has also been translated into Japanese and German for international publications.

He has written several book-length reports, including *A Guide to High-Speed Embedded Processors* and *A Guide to Wireless Handset Processors*.

Linley also provides high-level consulting to the microprocessor industry on subjects such as product positioning, strategic analysis, and competitive assessment. He has assisted companies such as Agere, Applied Materials, Hewlett-Packard, IBM, Intel, and Motorola, as well as several smaller companies and investment firms.

Linley's expertise, a rare combination of deep technical understanding and business savvy, is frequently sought by the technical and business press. He is often quoted in *The Wall Street Journal*, *Electronic News*, *Business Week*, the CNet web site, and other leading technology and business publications. He has also appeared on CNNfn, CNBC, Fox News, Tech TV, and National Public Radio. In 1997, Linley was profiled in *Worth* magazine as the analyst who "decodes Intel for the rest of us."

He founded The Linley Group in 1999 to provide technology and market analysis to a broad group of clients. Since then, the firm has established itself as the leading vendor of technology analysis of the networking-silicon industry.

Before founding his company, Linley served as publisher and editorial director of MicroDesign Resources' *Microprocessor Report*, leading the top independent technology-analysis team in the microprocessor industry. Under his leadership, the publication won the Computer Press Award for best industry newsletter four times in six years. He joined MDR in 1992 as its first full-time analyst.

Before joining MDR, Linley spent eight years working on RISC systems at Hewlett-Packard. As a design engineer, he developed test and initialization firmware for HP's PA-RISC servers, gaining a deep understanding of the operation of large multiprocessor servers. He later worked on PA-RISC processor design.

Linley then served as program manager for HP's Model 810 and 815 Unix systems, successfully driving those projects to market. He began seriously analyzing the microprocessor industry while serving as product marketing manager for HP's PA-7x00 family of RISC processors.

He graduated *cum laude* from Yale University with a bachelor of science degree in electrical engineering. While at Yale, Linley also studied at the graduate School of Organization and Management. As a student, he served as vice president of the Yale Political Union and chairman of the university's Independent Party.

About the Publisher

The Linley Group

The Linley Group is the leading vendor of technology analysis on networking, communications, and consumer-electronics semiconductors, providing a unique combination of technical expertise and market knowledge. We help clients understand the market for these devices, their product requirements, the choices available, and which ones are best for a particular application.

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Our reports are written by our own expert analysts. Technical accuracy is very high, as each vendor provides information about its products and reviews our presentation of those products. We add our analysis and insight, comparing and contrasting the various offerings and indicating the applications for which they are best suited. To ensure that our opinions are objective and unbiased, The Linley Group does not accept stock or retainers from the companies we cover. Our reports are used by more than 200 companies, including leading equipment makers, chip makers, software vendors, and investment firms.

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clients, including Agere, Altera, AMCC, Cavium, Cypress, Hifn, HP, IBM, IDT, Intel, Motorola/Freescale, Wintegra, Xelerated, Xilinx, Crosslink Capital, U.S. Bancorp Piper Jaffray, and Ziff Brothers Investments. Typical consulting projects include the following:

- Working with a startup to help direct its initial product definition to best differentiate it from potential future competitors
- Helping an established semiconductor vendor with messaging and positioning for an upcoming product launch
- Assisting an equipment vendor to select key components that are most appropriate for its application
- Providing valuable insights and technical due diligence to an investment group evaluating whether to invest in a semiconductor company

Our analysts start with a deep understanding of the key technologies in these markets, ignoring the hype and finding the features that make a difference. But we also understand that market success is based on business strategy as much as on technical excellence, and our recommendations are always steeped in the realities of the marketplace. We understand the dynamics of startups and established corporations alike and can shape our message to apply to the client's situation.

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The Linley Group presents focused seminars that analyze products and design strategies in a particular technology segment, providing information that engineers can immediately use to improve their designs. These one-day events feature in-depth technical presentations from our own analysts as well as leading technologists from the industry. Hundreds of people have already attended.

Please check our web site for a list of upcoming seminar dates, topics, and locations. The web site also offers the proceedings (slides) from past seminars free of charge.

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Preface

What This Report Covers

This report covers demodulator chips, including those with companion tuners, for mobile TV. We use the term demodulator to describe the baseband physical-layer processing required to recover the signal captured by a tuner, and we use the term receiver to describe the combination of tuner and demodulator. The report does not specifically address tuners or media decoders except when they are part of a chip set including a demodulator or are integrated on the same die as a demodulator. The report also includes a forecast for devices supporting mobile-TV reception, including detailed breakouts for the largest countries, each standard, and the major applications.

Who Should Read This Report

This report is designed to meet the needs of a variety of readers:

- Engineers who need to select a supplier of TV chips for use in the handsets, media players, navigation systems, or other mobile systems they are designing
- Marketing and engineering staff at companies that sell mobile-TV chips or products that work with these chips
- Technology professionals who wish an introduction to mobile TV
- Financial analysts who desire a detailed analysis and comparison of mobile-TV chip suppliers and their chances of success
- Press and public relations professionals who need to get up to speed on this emerging technology

As described below, the report is structured to allow different readers to skip certain sections, as needed. For example, experienced communications engineers may wish to focus on the vendor and comparison chapters; financial analysts may instead focus on the tutorial, forecast, comparison, and conclusion chapters.

Organization of the Report

The first two chapters provide a tutorial and overall introduction to mobile TV and its enabling technologies. Chapter 1 introduces mobile TV, defining the term, describing the types of systems supporting mobile TV, introducing the various mobile-TV standards (such as ISDB-T 1Seg, DVB-H, DVB-SH, MediaFlo, T-DMB and S-DMB) and where the standards have been deployed, and discussing the business issues that affect adoption of mobile TV. Chapter 2 describes mobile-TV technology in greater detail, discussing technological issues in mobile-TV reception, OFDM technology, MPEG decoding, and digital-TV standards. Readers who are familiar with mobile TV, multimedia standards, and radio-frequency design issues may wish to skim or skip these chapters. The appendix provides pointers to additional sources of tutorial information.

Chapter 3 defines and describes the design and features of mobile-TV receivers generally, setting the stage for later discussions of individual products. Chapter 4 examines the mobile-TV market, providing detailed forecast information for mobile-TV systems and chips.

Chapters 5 through 21 offer a detailed look at the leading mobile-TV chip suppliers and their current products. For each vendor, the report provides a company overview, strategy analysis, key product features, product roadmap, and overall conclusions. Vendors covered are Abilis, Afa, Analog Devices (Integrant), DiBcom, Frontier, GCT, Imagination, Infineon, Legend, Mavrix, Maxscend, MediaPhy, Newport, Qualcomm, Siano, Telegent, and Texas Instruments.

Chapter 22 provides briefer coverage of other vendors of mobile-TV chips, including AMD, Broadcom, LG, NXP, Samsung, and Telechips. It also lists several other minor players in this space, including Asian-based module vendors.

Chapter 23 provides technical specifications and makes detailed comparisons among the mobile-TV products covered. Chapter 24 provides some closing thoughts on the market and which vendors will do best.

Acknowledgments

The authors wish to thank the numerous people at the many vendors covered in this report who supplied information on their products and reviewed sections of the report. These reviewers helped ensure the best possible technical accuracy.

Thanks go to our ever-vigilant copy editor, Ellen Clements, for keeping our grammar straight; and Eileen Schmidt, who assisted with production.

Executive Summary

Mobile TV is a new feature for cellular handsets, personal media players, and other mobile systems. Because of its applicability to handsets, which ship in quantities exceeding one billion units annually, the potential market for mobile-TV chips is huge. Attracted by this potential, scores of semiconductor companies are developing mobile-TV receiver chips. Acceptance of the technology varies among the deployments that have taken place worldwide. There have been a few unbridled successes, a few failures, and several deployments where the outcome is unknown—either because they are too recent or because data is not available. Further complicating the situation, the mobile-TV industry has developed more than a half-dozen similar, yet incompatible, standards.

Despite the uncertainty about the market, we are optimistic about its growth. We expect the worldwide percentage of handsets integrating mobile-TV receivers to reach 10% in 2010, driven by Japan, where the attach rate already exceeds 30%, and South Korea. In 2011, accelerating growth in China and other countries will increase shipments of mobile-TV devices to about 245 million units. Handsets will account for more than 80% of these devices. Shipments of mobile-TV chips and chip sets will be greater, because chips must ship in advance of systems. We project mobile-TV chip revenue of \$320 million in 2007. This revenue will increase over time but not as fast as unit shipments, due to falling prices.

The industry has developed a dizzying number of standards; so far, most have been deployed in a single region. Japan uses 1Seg, a mode of ISDB-T, for its mobile standard. Qualcomm has convinced the two largest U.S. cellular operators to adopt its MediaFlo standard, but deals to establish MediaFlo in other countries are still in development. Trial deployments using the T-DMB standard, derived from DAB radio, have taken place around the world, but the technology's only notable success has been in Korea. Korea additionally has a broadcaster using the S-DMB standard. Broadcasts using T-DMB are also taking place in China, but that country will deploy a native technology, most likely CMMB, for its national standard. Italy is the site of the first commercial DVB-H network, and DVB-H is likely to be used across Europe and in some Asian countries. France will supplement its DVB-H coverage with satellite-based DVB-SH service, which is also being deployed in the United States.

The proliferation of standards has led to the proliferation of chip companies seeking to serve the mobile-TV market. DiBcom is the dominant DVB-H chip supplier, having successfully applied the technology it created for mobile DVB-T to the creation of a DVB-H receiver. The company is adding support for ISDB-T and T-DMB.

Expanding beyond its tuner business, Analog Devices offers a single-chip receiver for T-DMB. The company competes directly with GCT Semiconductor, another supplier of single-chip T-DMB receivers. GCT also offers S-DMB products.

Several other companies are pursuing T-DMB. One is Frontier Silicon, which is building on its extensive experience in DAB. To reduce system cost, LG Electronics and other companies have built MPEG decoders in their T-DMB receiver chips. Small Korean and Chinese companies offering T-DMB demodulators include Mavrix, Maxscend, Nexilion, and Telechips.

Startup Siano Mobile Systems differentiates its products through their low power and support for multiple standards. Following a similar strategy, MediaPhy recently emerged on the market.

Taking the approach of offering several single-standard chips, Newport Media is the first company to offer a single-chip 1Seg receiver. Newport also offers a DVB-H receiver and is likely to be the second company (after Qualcomm) to offer a MediaFlo receiver.

Qualcomm is unusual in its scope of investment in mobile TV. The company developed the MediaFlo standard, produced the first chips for that standard, built the MediaFlo USA broadcast network, formed the Flo Forum trade group, and created MediaFlo Technologies to spearhead business development of the standard.

Several handset IC companies have joined the mobile-TV fray. Texas Instruments and NXP Semiconductor both developed DVB-H products, but both have since retreated. Broadcom and Infineon, however, are advancing with new designs due to ship in 2008.

Proving that mobile-TV is not strictly a digital affair, Telegent Systems has taken the unusual tack of also supporting analog TV. A few intellectual-property companies support mobile TV as well. The most significant of these is Imagination Technologies, which is already well established in selling graphics IP for use in handsets.

Each standard and regional market can support multiple suppliers. Therefore, we expect several mobile-TV chip suppliers to remain in business, between one and three serving each standard. Even so, the vast herd of suppliers must be thinned. The best chance for orderly consolidation is for handset-chip companies to acquire most of the surviving mobile-TV chip suppliers. Because mobile TV is so closely tied to handsets, this outcome is likely.