

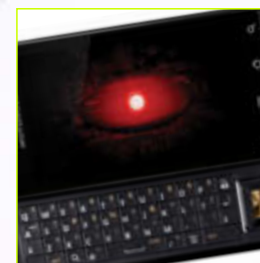
NET NEUTRALITY
IS NEGATIVE NEWS



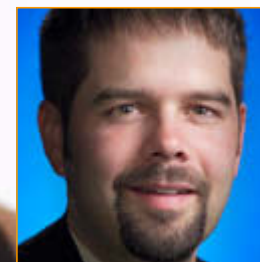
WHATEVER HAPPENED
TO FEMTOCELLS?
ASK THE OPERATORS



DROID ARRIVES
AS ANDROID RISES
TO CHALLENGE
THE OS MARKET



COMBO CHIPS
PACK A PUNCH



SECURITY IS A KEY FACTOR IN FEMTO ADOPTION

SMART OPERATORS CAN USE FEMTOCELLS TO ADDRESS THEIR INDOOR COVERAGE ISSUES, BUT NOT BEFORE THEY CAN GUARANTEE THE SECURITY OF THEIR OPERATION.

DOWNCONVERTING MIXERS
CUT POWER AND IMPROVE
PERFORMANCE IN 4G
BASESTATIONS



EDITORIAL BY LOUIS E. FRENZEL, *EDITOR-IN-CHIEF*

NET NEUTRALITY IS NEGATIVE NEWS

MORE REGULATION IS ON THE WAY, WHICH IS WHAT THE WIRELESS INDUSTRY DOESN'T NEED.

You've probably been hearing about net neutrality for a while now. But perhaps you haven't considered its impact, especially on the wireless and electronics industries. The Federal Communications Commission wants to formalize net neutrality into a hardcore set of rules that will have a huge impact on the industry and the consumer.

With net neutrality, all Internet traffic will be treated equally. There would be no discrimination against any form of data, whether it's a Voice over Internet Protocol (VoIP) phone call, short text message, music downloads, or streaming video. That in itself is a good thing. But that's what we have now, with a few exceptions.



Louis E. Frenzel

The downside is that the new rules won't let carriers "manage" their networks to block or slow any traffic for any reason. Carriers already essentially practice those guidelines without regulation, except in cases where such traffic overloads the network and keeps others from using it. Video is the killer in most cases, and it is a real problem in wireless networks that weren't designed for video. And it could get worse despite the forthcoming Long-Term Evolution (LTE) upgrades to basestations and the new OTN infrastructure.

The carriers need to be able to manage their networks to provide service to all those who pay for it and to ensure quality of service. There have been very few cases where carriers have had to "control" the traffic, and they have been dealt with successfully on an individual basis. So why is there a need for regulation when there has been little or no abuse or problem? The answer is pretty clear. It's political.

Net neutrality pits the broadband and wireless carriers against the application providers. The biggest lobbyists for net neutrality have been Google, Amazon, Microsoft, Yahoo, and several others. These companies provide services to consumers for "free" thanks to broadband connections provided by AT&T, Verizon, Time Warner, Comcast, and all the others in the DSL/cable/wireless broadband business.

The proponents of net neutrality want consumers

to have unlimited access to their information and services no matter what their impact on the network traffic will be. It is part of their business model to have access to the broadband connections but not to have to pay for them—nice arrangement, for sure.



Is this man your friend or your enemy? It depends on who you are. This is Julius Genachowski, FCC chairman, who seeks more regulation of the Internet and those who bring it to you.

But providing that kind of connectivity everywhere is going to cost the carriers big time, and it will lead to complications and denial of service in some cases, especially if video downloads overwhelm the capacity of a wireless network. The typical YouTube video is

the equivalent of about 100 cell-phone calls, so you tell me if that won't become a problem at some point. It could also minimize the carrier's ability to make a decent profit so it can continue to upgrade its networks and employ technical workers.

In a free market, which we have had up to now in the Internet and wireless businesses, industry does just fine growing itself and dealing with problems that arise. Why tamper with success? And with so few abuses of the net neutrality principles, we should

let businesses work out the details among themselves. Regulation doesn't make sense. Let capitalism guide things, as it has been a successful approach in the past. Like most regulation, we otherwise will surely get some interesting if not bad surprises because of unintended consequences.

What we have here is political payback to Google and others who supported Obama for president in the election—government business as usual. Pay your friends but ignore the consequences on others. If the government regulates something, it should be to help or protect its citizens. The proposed net neutrality regulation does not seem to offer the consumer anything new or better, and it hurts many businesses for the benefit of a few others. The carriers pay the bill while the Web companies essentially get a free ride. That is the government favoring one group over another.

THE BOTTOM LINE

We are going to get the regulations despite protests from carriers, operators, and other companies. In fact, the FCC commission-

The Good And Not So Good At The FCC

The Federal Communications Commission (FCC) has the power to help us and hurt us with its decisions. Since communications affects everything we do today, we should all be concerned about what the FCC does. I urge you all to investigate the many various actions of the FCC at www.fcc.gov on a regular basis.

For example, the FCC recently auctioned off about 50 MHz of spectrum in the 700-MHz range that became available after the complete switchover to digital TV earlier this year. The FCC collected more than \$19 billion from the various carriers and operators. That was a great move, as it opens the door for greater expansion of wireless services and with greater bandwidth to support video and high-speed data apps. But the carriers paid dearly for it. Guess what? They will pass those costs on to you.

Also, the government set aside \$7.4 billion of stimulus money in an attempt to find a way to bring broadband access to the millions of underserved consumers in the U.S. That small amount won't even begin to fund a rollout of a nationwide high-speed network to the small towns and rural and remote areas that would like to get faster Internet access. The government wants all citizens to have fast Internet connections for informational and educational purposes. That is a good thing. But new rules and regulations will bring about the need for the government to spend additional billions to help roll out that network. You will pay for it through higher taxes.

And, the FCC now has a chief diversity officer. What is that all about? Why does the FCC need to get into the diversity issues that only seem to divide us more? That person is Mark Lloyd, one of more than 40 "czars" appointed by President Obama to help him implement his policies within government. The concept of czars is a bit scary to many, as these people are not approved by Congress or anyone but the president. These political appointees have the opportunity to change our lives without our approval. Are we witnessing one more step to the end of government by the people? ■

ers recently voted 5-0 to go ahead with the rule-making to make all this happen. Go to www.fcc.gov and print out the release. You can also print out the entire 107-page Notice of Proposed Rule Making (NPRM 09-93). The NPRM asks for comments by January 14, 2010. Definitely chime in and give your opinion.

This administration seems to be determined to regulate the Internet and those who

implement the networks. We will all pay more tax as well as for the products and services we want and need. Where is the benefit? The consequence is we will still get the mobile broadband that we all want, but it will force the wireless carriers to perform more upgrades sooner at a huge cost.

As a result, the telecom companies will have to adopt what is being called usage-based pricing. You will have to

pay for the amount of data you use—no more flat-rate pricing. If you use a lot of bits, you will be charged more. In the end, we all will pay more. I sincerely hope the FCC will be fair and balanced on this issue. I'm not sure I can count on that, but I can hope.

What are your thoughts? Where is the benefit to consumers or the electronics industry? Let me know at lou.frenzel@penton.com. ■

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- Agilent J7880A signaling analyzer for LTE



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INDUSTRY VIEW BY DARRYL STORK, *DIRECTOR OF PLANNING & OSS SOLUTIONS, NORTH AMERICA, AIRCOM*

WHATEVER HAPPENED TO FEMTOCELLS? ASK THE OPERATORS

IT ISN'T ALWAYS A TECHNICAL PROBLEM WHEN YOU'RE INTRODUCING NEW TECHNOLOGY.

Femtocells burst onto the scene in the U.S. with great fanfare in 2007.

Yet two years later, significant consumer adoption seems nowhere in sight, despite trials by AT&T, Sprint, and others. So what happened? What's really holding back the rollout of femtocell technology and consequential adoption by consumers? The simple answer is the operators.

Operators could have gone to market with a solution in 2007, but they declined because there was no standard for femtocell technology. They had the misconception that if femtocells were standardized, consumers could merely purchase them and plug them into the network, and inter-vendor competition would be "game on."



Darryl Stork

There are many standardized interfaces, such as the IUB interface between the basestation and the core in a 3G architecture. But history has taught us that operators have never been able to simply buy basestations from multiple vendors, plug them into any network, and have them work.

Instead of toiling away with standards, operators could have rolled out a high-capacity 3G HSPA network for urban and suburban environments built on femtocells where the basestation is partly paid by, housed by, climate-

controlled by, and powered by the consumers. Consumers even would have paid for the backhaul.

From an operator perspective, consumers would have paid for everything that goes into building a network. By not taking advantage of this market opportunity two years ago, the operators may have played right into the hands of the big macrocell manufacturers who were protecting their revenue streams by delaying femtocells through a standards process.

Now during the second half of 2009, Long-Term Evolution (LTE) is driving the issue. Operators will need to deploy picocells and femtocells as a cost-effective alternative to more expensive macrocell sites, especially when it comes to delivering LTE to where subscribers will use it the most—indoors.

Operators in the U.S. are moving cautiously with trials. However, progress toward femtocells as a

mass-market proposition is incremental and slow. Why? Again, the answer lies with the operators. The rollout of femtocell technology carries a variety of complex and never-before-seen challenges for an operator on a network planning and management level.

On average, an operator typically installs 300 extra basestations into its macro 3G network during each financial quarter. That operator has complete control over this process in terms of planning, choice of site, and deciding when the basestation goes live.

Flash forward into the near future and imagine that the cost for femtocells drops below \$200—a generally agreed upon price point by analysts that will drive mass consumer adoption. Special promotions during the holiday season especially will generate large consumer purchases in November and December.

In this scenario, an operator potentially faces

tens of thousands of new miniature 3G sites going live over a single weekend. These new sites could be anywhere, from a single femtocell in a house in the country to 50 or more units in a single apartment building, generating multiple and overlapping 3G signals.

Such a scenario creates a bubble of radio interference as multiple femtocell signals disrupt the macro network, impeding performance and impairing the customer experience. Only careful management and optimization of network resources will address this interference and ensure seamless integration between the femto and macro layers.

The sheer scale of a femtocell layer will place new stresses and strains on a network architecture. As consumers plug in their femtocells, network managers will have to confront sudden spikes in bandwidth demand across different parts of their network at different times.

The arrival of femtocells as a mass-market consumer proposition means that operators are no longer in exclusive control of their own network planning. This reality is a daunting prospect for them because it requires a new dimension in intelligent, dynamic, continually updated network planning and management.

This reality at least partially explains why operators are deploying femtocells at the current, methodical pace. Unless they appropriately forecast and plan for the various capacity challenges that femtocells will place on their network, they place the performance of their entire network at risk. ■

DARRYL STORK JOINED AIRCOM INTERNATIONAL IN 2003 AND LED THE EXPANSION OF SUB-SAHARAN AFRICA AS A TERRITORY FOR THE COMPANY. HE TRANSFERRED TO THE U.S. IN 2007, WHERE HE MANAGES THE PRODUCT BUSINESS DIVISION FOR NORTH AMERICA. HE HAS 15 YEARS OF SALES, MARKETING, BUSINESS DEVELOPMENT, AND TECHNICAL MANAGEMENT EXPERIENCE WITHIN THE TELECOM AND ENGINEERING FIELDS. HE CAN BE REACHED AT AIRCOM@GLOBALRESULTS.COM.

NEWS BY THE MD&D NEWS STAFF

DROID ARRIVES AS ANDROID RISES TO CHALLENGE THE OS MARKET

Motorola's Droid, which the company calls the first smart phone powered by the Android 2.0 operating system, is now on the market. According to Motorola, the upgraded operating system will provide access to the Internet at 3G speeds via the Verizon network or from any Wi-Fi hotspot. Its multi-window HTML browser also delivers the Web the way many users would expect, Motorola says. And according to market analysts, the OS is ready to compete with other platforms.

THE DROID DELIVERS

Droid users can toggle between six applications at once. They also can customize the phone with thousands of applications and hundreds of widgets available on Android Market. Preloaded applications and enhancements to Google Mobile Services include Google Maps, Gmail,



The Motorola Droid uses Android 2.0 for access to the Internet at 3G speeds. Its 3.7-in. high-resolution screen also improves the browsing experience.

YouTube, Google Talk, Android Market, Calendar, the Amazon MP3 store, and Verizon Wireless Visual Voice Mail.

The voice-activated Google Search serves up results based on location. For more, users type their query into the search bar on the home screen. Droid will then search content on the phone, such as apps and contacts, as well as on the Web. It also is the first de-

vice to offer Google Maps Navigation, with turn-by-turn voice guidance, live traffic, Street View and satellite imagery, and the latest business information.

Users additionally can keep track of all of their messages with integrated Gmail and Exchange e-mail pushed directly to them. With the Android notification panel, users can go straight to a message or ignore it and then get

back to whatever they were doing. A smart dictionary learns as the user types and automatically includes all contacts.

The Droid offers a 3.7-in. high-resolution screen (*see the figure*). Its 854-pixel width reduces the need for side-to-side panning. Also, its more than 400,000 pixels is better than twice the total of its leading competitor, according to Motorola. Its 5-Mpixel camera includes a dual-LED flash, AutoFocus, and image stabilization with 16 million-color capability and DVD-quality video capture and playback. And, all of those visuals can be stored on the Droid's 16-Gbyte memory card.

Motorola accounted for 5.4% of worldwide unit shipments in the second quarter of 2009, which is down from its 22.5% total in the second quarter of 2006, says iSuppli Corp. While mobile handset shipments grew by nearly 7% in the third quarter, Motorola

saw an 8.1% decline in the same period. And, it was the fifth largest cell-phone company in the world in the third quarter of 2009, while it was fourth in the second quarter and as high as second in the first quarter of 2007. Droid should help reverse those trends.

"Droid is potentially a game changer for Motorola," said Tina Teng, senior analyst of wireless communications for iSuppli. "Motorola now is no longer just emphasizing slick form factors, such as it did with its RAZR handset. The company now has focused on the hottest segment of the global handset market, providing compelling smart-phone products that are usable and expandable through third-party applications. Droid also has capitalized on the trend toward smart-phone widgets, which allow users to customize products according to their own personality."

The Droid is now available in the U.S. exclusively

at Verizon Wireless Communications stores and online for \$199.99 with a new two-year customer agreement after a \$100 mail-in rebate. Nationwide voice plans begin at \$39.99 for monthly access for 450 minutes. The E-mail and Web for Smartphone plan is \$29.99 for monthly access.

THE ANDROID REVOLUTION

Android debuted in 2008, so it is only expected to account for 2.4% of the total smart OS market in 2009. Yet iSuppli expects it to see the fastest growth in usage of any smart-phone OS, with 2013 shipments rising at a compound annual growth rate (CAGR) of 118% from 2008. This will give Android a 9.1% share of the global smart-phone market in 2013 as well as fourth place in the rankings, up from its last place slot at seventh in 2008 and 2009. Several factors will propel this success.

First, Android is licensed by seven key handset OEMs, including Samsung (number two), LG (number three), Motorola (number four), and Sony Ericsson (number five). It's also sup-

ported by eight global wireless operators—including Verizon, Sprint, T-Mobile, and China Mobile—which is the most among the seven major OSs in the smart-phone market. And, the free turn-by-turn navigation available on the Droid and enabled by Android will attract consumers and challenge the portable navigation device industry.

According to the Market Intelligence & Consulting Institute (MIC), smart phones equipped with Android will reach 6.5 million units in 2009 and grow to 31.8 million units in 2013. Also, MIC says the CAGR for Android phones will be significantly higher than the overall CAGR for smart-phone shipments. Overall shipments of Android-equipped products, which include PC-like products and portable and residential devices, will reach 126 million units in 2013.

“Currently, products equipped with the Android platform are still mainly smart phones. Faced with the threat from the Android platform, Symbian could accelerate the opening of its system in order to attract more companies,” said Kate Huang, MIC industry

analyst. “Windows Mobile could lower licensing fees in order to reduce the impact from Android.”

Google’s launch of the Android platform and the establishment of the Open Handset Alliance (OHA) have changed the overall mobile industry value chain. Android’s open character can provide more customization options for mobile operators. It also benefits the differentiation of product interfaces such as the HTC Sense UI and MotoBlur. Its free and open-source code will stimulate more consumer electronics and PC vendors to use the Android platform as well.

According to MIC, the increasing number of Android products and the variety of hardware specifications will lead to program-related problems. This will lower the willingness of developers to make investments and limit the performance application programs.

The Android Market’s 13,000 available applications lag behind the Apple App Store’s 85,000 total. But if Google accelerates the promotion of paid download programs in

other regional markets, MIC says, it might significantly increase the willingness of application service developers to invest and rapidly increase the number of application programs to attract more users.

iSuppli
www.isuppli.com
Market Intelligence & Consulting Institute
<http://mic.iii.org/tw/english/>
Motorola
www.motorola.com
Verizon Wireless
www.verizonwireless.com

PARTNERSHIP DEVELOPS MOBILE P2P PAYMENT SYSTEM

CashEdge Inc. and Firethorn Holdings LLC have entered into a strategic relationship to market an integrated mobile person-to-person (P2P) payment solution using CashEdge’s POPmoney P2P payments service and Firethorn’s Mobile Wallet solution. According to CashEdge, 77% of its customers would prefer to use a P2P payment service offered through their financial institution compared to an independent service.

With this deal, financial institutions will be able to let their customers send electronic payments using POPmoney from within their Firethorn mobile banking application by simply using the e-mail address or mobile phone number of the recipient. Likewise, recipients can receive the funds directly into their account. Through Mobile Wallet, customers can view account balances, check credit card balances, transfer funds, view and pay bills, and access other services through their mobile devices.

CashEdge Inc.
www.cashedge.com
Firethorn Holdings LLC
www.firethornmobile.com

SAMSUNG ANNOUNCES OPEN MOBILE APP CONTEST

Hoping to drive new applications for its Omnia II (I8000) smart phones, Samsung Electronics has launched its Global Developer Contest. The competition will run through December 23. The top two winners will receive \$100,000 each, with 34

other individual prizes of \$10,000, \$5000, and \$2000 available.

The winning applications will be distributed free of charge for up to four months after the competition at the Samsung Application Store (www.samsungapps.com). The winners also will be able to maintain a continuous partnership with Samsung through future opportunities, including Samsung’s mobile programmer support program.

“Through their active participation, Samsung hopes this contest will offer many opportunities to application developers,” said Hosoo Lee, executive vice president of Samsung’s Media Solution Center. “We want them to be able to profit from their work, while at the same time giving our customers a rich variety of applications to customize their phones.”

The contest is open to applications in both English and Spanish. Categories include games, entertainment, health/life, e-book, productivity, reference, social networking, and utilities. Contestants must be registered to sell paid applications at the Samsung Ap-

plication Store Seller Office. Winners will be announced in late December.

Samsung Electronics
<http://seller.samsungapps.com>

B&N’s NOOK CHALLENGES AMAZON’S KINDLE

Just in time for the holiday season, Barnes & Noble will release its nook e-book reader on November 30. Its \$259 price is competitive with Amazon’s Kindle, which also costs \$259—or \$279 with international wireless capability. The nook’s features are designed to rival the Kindle as well.



According to Barnes & Noble, the nook is the first Android-based e-book reader. It's also the first such device to offer a color touchscreen for navigation. It provides 3G wireless access for instant content downloads via AT&T's mobile broadband network as well as Wi-Fi at Barnes & Noble stores.

"We asked our customers what they wanted in an e-book reader and specifically designed nook to be the most full-featured, fun, stylish, and easy to use e-book reader on the market," said William J. Lynch, president of Barnes & Noble.com. "With our nationwide footprint, Barnes & Noble customers can see, touch, and hold nook."

The nook is about the size and weight of a paperback book. There's no glare or backlight in its E Ink Vizplex display, which looks as clear as a printed book. Text size is adjustable for comfortable reading as well. The lower touchscreen serves up cover art and other graphics in color while presenting a virtual keyboard, controls, and other navigation tools only when they're required (see the figure).

Also, the nook's LendMe technology allows users to lend a selection of e-books to friends free of charge for up to 14 days at a time. Users simply choose the book they want to share and send it to their friend's nook or any iPhone, iPod touch, select BlackBerry and Motorola smart phones, or PC or Mac equipped with Barnes & Noble's eReader software.

With the nook's Reading Now virtual bookmark, readers can start right where they left off in whatever book they're reading. And thanks to the eReader software, users who don't have their nook with them can continue anyway through their smart phone or laptop, including annotations. When it's time to use the nook again, the Reading Now page will be updated and ready to go.

The nook can store up to 1500 e-books and other printed content. It offers an expandable memory

Nokia has set up an exchange program for its AC-3E, AC-3U, and AC-4U chargers, which are manufactured by a third party, because their plastic covers can come loose and separate, exposing users to shock hazards.

slot, so 16-Gbyte MicroSD Cards can add another 17,500 e-books. More than 1 million e-books, newspapers, and magazines are already available, with most bestsellers and new releases for \$9.99. In fact, the first 10,000 customers to pre-order the nook can get Malcolm Gladwell's *The Tipping Point* for free.

Barnes & Noble
www.bn.com

NOKIA ANNOUNCES CHARGER EXCHANGE PROGRAM

Consumers who own certain Nokia-branded chargers manufactured by a third-party supplier can exchange these devices for free replacements. During a routine quality-control process, Nokia says that it discovered that the plastic covers of the affected chargers could



come loose and separate, exposing their internal components and potentially posing an electrical shock hazard if certain internal components are touched while the charger is plugged into a live socket.

Nokia says that it is not aware of any incidents or injuries related to these chargers, which include the AC-3E and AC-3U models, manufactured between June 15, 2009, and August 9, 2009, and the AC-4U model, manufactured between April 13, 2009, and October 25, 2009. To find out if a particular charger is part of this exchange program, consumers can go to <http://chargerexchange.nokia.com> or their local Nokia Web site. Nokia urges consumers within the scope of this exchange program to stop using their chargers and exchange them for a free replacement.

Nokia
www.nokia.com

SYMBIAN LAUNCHES HORIZON PUBLISHING PROGRAM

The Symbian Foundation has announced the launch of the Symbian

Horizon publishing program. Developers can sign up to have their applications listed in the Symbian Horizon Directory, processed through Symbian Signed, and published to a growing list of application store partners. According to the organization, Symbian Horizon is designed to help developers cost-effectively bring their applications to the largest mobile market in the world. The publishing program is now being scaled up to process thousands of applications in 2010.

The foundation says that Horizon demonstrates Symbian's commitment to improving the developer experience, including helping developers build applications, place them in a variety of global stores, and provide marketing support. Also, the foundation says it created the program in response to developer concerns that there were too many challenges and costs associated with developing and publishing a Symbian application to the global market. In addition to reducing these costs, the foundation seeks to improve developers' access to global markets through

translation and localization assistance.

Since Horizon's launch plans were announced in July, Symbian has processed an initial group of 50 applications and is helping these developers sign and submit their products to mobile application stores worldwide. Five stores now support Horizon: Nokia's Ovi Store, the Samsung Applications Store, AT&T's MEdia Mall, China Mobile's Mobile Market, and Sony Ericsson's PlayNow arena.

"The diversity of application stores in our ecosystem increases the burden on developers by requiring multiple submission and review processes," says Lee Williams, executive director of the Symbian Foundation. "But this diversity can also offer an advantage over competitors' closed systems, where applications sometimes receive arbitrary or commercially motivated rejections. Symbian Horizon retains this advantage while reducing the burden by becoming a conduit to multiple stores, helping developers reach the largest global market in the world more efficiently."

Developers will be able to participate in the pro-

gram in three ways. First, all developers can have their Symbian Signed applications appear in the Symbian Horizon Directory free of charge. The directory is designed to provide a complete guide to every Symbian Signed application as well as where they can be downloaded or purchased. It is live in beta, showcasing an initial group of applications and allowing developers to submit other applications that have already been signed.

Second, the Symbian Signed process will be revised over the next few months, giving developers the option of automatically adding an application to the Symbian Horizon Directory. Developers will be able to register online and edit their application and developer profiles, providing stores and consumers alike complete information about their products.

Finally, Symbian Horizon will begin to increase the number of applications processed through Symbian Signed and submitted to application store partners over the next few months. In addition to the first group of 50 applications, another 50



Consumers will be able to enjoy their favorite programs on the road thanks to a deal between Mopar and Audiovox, which will begin supplying Chrysler dealers with the first OE hardware interface for FLO TV Auto Entertainment. The service will be available in select Chrysler 2010 vehicles, including the Chrysler 300 (a) and the Jeep Commander (b).

will be processed through the review and signing process and submitted to all participating stores at no cost to the developer. A comprehensive program designed to process thousands of applications will be launched in 2010.

The foundation has analyzed the costs of processing these applications and says that the program will require a significant investment. Over the next few months, it will host an “open conversation” at ideas.symbian.org to explore funding options. According to the group, funding is a critical issue, and the solution ultimately will depend upon collaboration

with many contributors, including existing members, application stores, and the developers themselves. The plans for this program will be developed jointly with input from all of these constituents.

The Symbian Foundation
www.symbian.org

DEAL BRINGS FLO TV TO CHRYSLER CARS

Through Mopar, Audiovox Corp. will begin supplying Chrysler dealers with the first original equipment (OE) hardware interface for FLO TV Auto Entertainment, which will

be used in select Chrysler 2010 vehicles. Chrysler is the first automaker to offer FLO TV directly through its dealer network.

The program is expected to launch as a dealer-installed option from Mopar in late December for the 2008-2010 Chrysler 300, Chrysler Town & Country, Jeep Liberty, Jeep Grand Cherokee, Jeep Commander, Dodge Charger, Dodge Grand Caravan, Dodge Journey, Dodge Nitro, Ram 1500, Ram 2500/3500, and Ram Chassis Cab (*see the figure*).

The FLO TV service is live mobile TV, including sports, breaking news, children’s shows, prime time

programming, and daytime dramas. The universal hardware solution works with the Audiovox OE headrest DVD and seat-top solutions. Also, the hardware solution can integrate with factory rear-seat entertainment systems.

Up to 20 channels will be available in late December, when FLO TV will be available for dealer installation. By the end of 2009, FLO TV should be available in more than 100 major markets and many interstate driving corridors, providing service coverage for more than 200 million potential customers. It won’t be available in some rural areas, though.

Audiovox will supply the hardware, which integrates with the vehicle’s existing entertainment systems and Mopar 7-in. DVD screen systems. A small antenna, similar in size to a laptop mouse, is mounted on the roof to deliver the digital TV signal. The receiver and wiring are installed under the interior trim. Wired and wireless remote controls let viewers surf channels just as they would at home.

Audiovox
www.audiovox.com
Chrysler Group LLC
www.chrysler.com
FLO TV Inc.
www.flotv.com
Mopar
www.mopar.com ■

COVER STORY BY RASA SIEGBERG, WORLDWIDE SYSTEMS ENGINEERING MANAGER, MOBILE & NETWORKING SECURITY SOLUTIONS, SAFENET INC.

SECURITY IS A KEY FACTOR IN FEMTO ADOPTION

SMART OPERATORS CAN USE FEMTOCELLS TO ADDRESS THEIR INDOOR COVERAGE ISSUES, BUT NOT BEFORE THEY CAN GUARANTEE THE SECURITY OF THEIR OPERATION.



Rasa Sieberg

Mobile phones have become the preferred method of communication for consumers worldwide, offering a wide variety of voice and data services. But while the devices are “mobile” in nature, it is a small surprise that “mobile phone calls” are, however, less “mobile” than is expected. In fact, a significant number of the calls and data sessions initiated by mobile devices originates in the confines of the consumers’ homes. This can pose problems for the operators of mobile phone networks.

Due to the physical characteristics of the radio waves in the high frequencies that the cellular networks use, the provision

of good network coverage in indoor locations is somewhat problematic, and it poses a serious challenge for the mobile carriers to overcome. To address the bandwidth and quality of coverage demanded by their subscribers, mobile operators are turning to femtocell systems.

Femtocell access points (FAPs) are close-range, limited-capacity basestations that utilize residential broadband connections to connect to carrier networks. The use of such distributed basestation architecture improves reception and allows

the operators to deliver fast, seamless, high-bandwidth cellular coverage into the homes and offices of their end customers.

The deployment of femtocell solutions is overwhelmingly attractive to mobile network operators as they successfully address coverage and mobile data bandwidth requirements by leveraging widely available broadband connections

without the extraordinary cost associated with the alternative macro-cell deployment. Like all communications technologies, though, femtocells also require robust security.

HOW TO COUNTER THREATS

FAPs and femto gateways (FGWs) leverage ubiquitous broadband (ADSL,

ADSL2+, cable, etc.) Internet Protocol (IP) communications for the backhaul of cellular voice and data communications. As with any IP-based networking architecture, the communications between the client device, the FAP, and the carrier’s core network must be secured against eavesdropping, fraud, and other malicious activity.

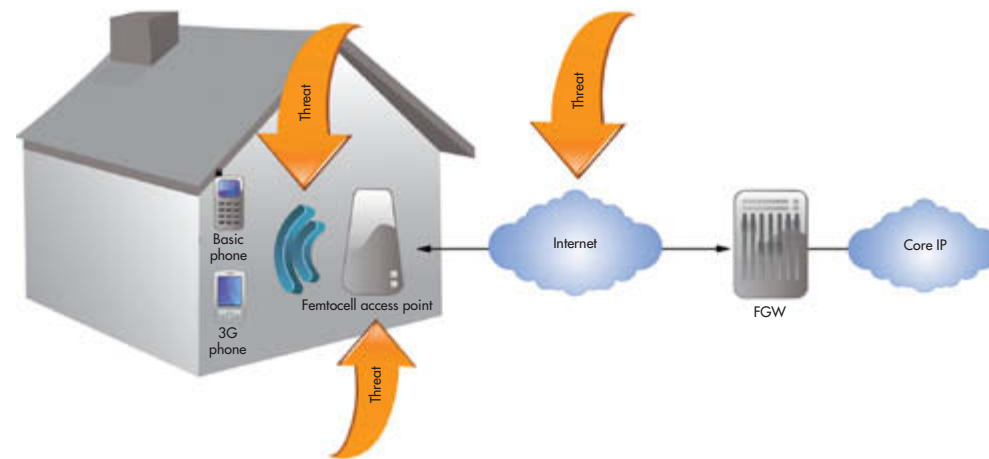
To maintain the level of security that is expected of the telecommunications networks, femtocell systems require that the authenticity of the communicating peers (access points and gateways) and the privacy

and integrity of the data exchanged are guaranteed. The threat model consists of attack threats from third parties that try to compromise the security of the communication links and from hosting parties that attack the FAP devices themselves (Fig. 1).

The most common threats posed by existing customers include hacking, reverse engineering, and device cloning. These insider attacks, which target the customer premise equipment (CPE) devices (the FAP), can be driven by simple curiosity or by organized crime, billing fraud, or grey imports.

Security concerns associated with femtocell-enabled networks can be classified into three main categories:

- Device and network authentication: FAPs and the network must mutually authenticate to become part of the cellular network.
- Data privacy: When the connection to the carrier is over a public, hostile, and unreliable IP network, the privacy and therefore confidentiality of data shared between the FAP and the



1. Third-party attacks on networks include man-in-the middle attacks, traffic snooping/redirection, fake basestation attacks, and authentication snooping. These attacks target the communications between the handset and the FAP and/or the FAP and the FGW for the purpose of eavesdropping, service disruption, attack staging, or billing fraud.

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network and handsets must be ensured.

- Integrity: When the FAP is physically vulnerable to tampering by malicious users, the validity of billing, subscription, and device data must be secured.

The ongoing standardization effort for femtocells has addressed peer authentication and backhaul privacy and integrity issues by prescribing the use of a combination of the strongest and most versatile of the security measures designed for IP communications: the Internet Key Exchange v2 (IKEv2) and the IP Security (IPsec) protocols.

SECURING THE BACKHAUL

The FAP and the network must be able to mutually authenticate each other for the FAP to become part of the carrier's network. For this process to occur, the FAP, the FGW, and the security gateway that sits between the public Internet and the mobile operator's core network must be able to establish a secure means of bi-directional communication—a secure tunnel.

Both sides must be able to verify the peer. The system also needs to be flexible to leverage the existing authentication

back ends and infrastructure employed by carriers, including remote authentication dial-in user service (RADIUS) servers, home location registers (HLRs), and the various forms of subscriber identity module (SIM) cards employed today.

Standardized by the Internet Engineering Task Force (IETF), IKEv2 has been prescribed for the FAP and FGW authentication requirements of addresses. It is a flexible protocol that supports many actual authentication methods. The authentication within IKEv2 can be performed with Public Key Infrastructure (PKI) certificates, shared keys, or even SIM cards.

IKEv2 also supports the Extensible Authentication Protocol (EAP), which is a key feature in applying the IKEv2 protocol in many existing authentication schemes or systems. After successful negotiation, identification, and authentication of all parties, IKEv2 generates the keys and establishes the connection for further secure communication.

While IKEv2 is used to authenticate the access points and gateways for each other, the actual secure communication channel is realized with IPsec. This is another IETF standardized protocol for securing Internet communications. The

support for the IPsec protocol is a requirement for protecting the IP backhaul of the femto-cell system.

IPsec protects the IP traffic as it travels over the broadband connection back to the carrier's core network. It is a flexible and efficient method of providing data integrity and confidentiality. While IPsec is a complex suite of many protocols, backhaul security within femtocell networks focuses specifically on one variant, the Encapsulating Tunnel Payload (ESP) tunnel variant (Fig. 2).

The strong cryptography involved in this security protocol makes it somewhat computationally intensive. In most application scenarios, the platform CPE bears the computational cost, which may not be practical in the case of the FAPs. Since the entire femtocell business model relies on the affordability of the access points, it implies that high-performance (and therefore expensive) CPE is not a viable option.

For packet encryption and decryption to be efficiently managed, FAPs and FGWs must rely on cryptographic hardware for offloading the workload. The market of cryptographic hardware accelerators provides several options available to device, equipment, and system-on-a-chip (SoC)

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vendors. Two of the most viable options for femtocell networking are standalone cryptographic cores and packet engines.

Standalone crypto cores deal with crypto offload only, leaving all other protocol operations to be done on the host CPE. Aside from cryptography, which is expensive, there are many other operations that need to be done for each packet.

Packet engine-type accelerators deal with entire packets to offload even more of the security overhead to the accelerator hardware. Packet engines are more complex designs but offer superior offloading capabilities and better performance than the more simplistic offload methods.

TAMPER-RESISTANT FAPs

FAPs are gateways to the carrier core IP network and the carrier's radio network. Femtocells are prone to attacks by curious engineers and malicious criminals due to this connection and because they are part of the CPE. Regardless of the motives of the attack, though, the FAPs need to be tamper-proof.

2. At a basic level, IPsec performs encryption and decryption of each packet that flows between two networking components.

The standards for FAPs call for the configuration data for the radio, encryption keys, and identity material, as well as the operational statistics to be stored in the access point itself. This data is sensitive and must not be available to any party but the carrier. To achieve this, the data must be stored in a robustly protected "cryptographic safe" within the device.

Consumer-permitted devices have a long history of being compromised. To prevent FAPs from falling victim to the same fate, several precautions must be taken:

- **Secure boot functionality:** The device must only boot software images or accept data endorsed or signed by the manufacturer.
- **Runtime integrity protection:** While the device is

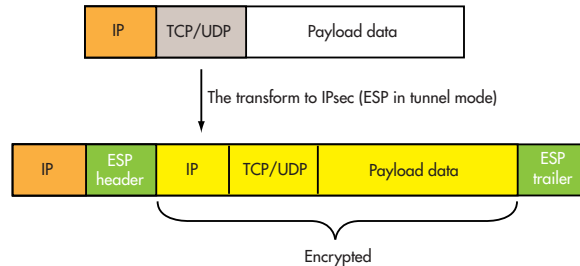
running, the software images that it executes must not be alterable. Attackers must not be able to change the software while it is running.

- **Secure storage:** Carrier assets within the device need to be protected through storage within a "cryptographic safe" that is only accessible to the operator.

ACHIEVING FEMTOCELL SECURITY

While observations of the threat model may seem overtly pessimistic, the picture isn't bleak. Threats can be identified, and the technology and expertise to counter the threats is available. The key to a secure and robust system lies in expertise and experience, combined with the best technology. For example, SafeNet provides a com-

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plete, carrier-grade femtocell security solution for providing the peer authentication, data privacy, and device integrity demanded by the telecom industry for femtocell networking environments.

Femtocell SoC vendors can implement platform security features such as secure boot, secure storage, and runtime integrity monitoring. Complementary software (or "security middleware") can give customer software applications seamless access to the platform security features of the device.

Available products from SafeNet include the QuickSec/IPsec toolkit and SafeNet's SafeXcel IP Packet Engine. These hardware/software products provide system integrators with a complete and proven, easy-to-integrate security offering that reduces development cost and minimizes time-to-market. ■

RASA SIEGBERG JOINED SAFENET IN 2005 AS A SYSTEMS ENGINEER AND CURRENTLY PROVIDES STRATEGIC GUIDANCE; SALES, PRODUCT MANAGEMENT, AND MARKETING SUPPORT FOR ALL EMBEDDED HARDWARE AND

SOFTWARE SECURITY PRODUCTS AT SAFENET WITH A SPECIAL FOCUS ON NEW TECHNOLOGIES WITHIN THE TELECOM/MOBILE INDUSTRY. HE RECEIVED HIS

MASTER'S DEGREE FROM HELSINKI UNIVERSITY IN HELSINKI, FINLAND. HE CAN BE REACHED AT RASA.SIEGBERG@SAFENET-INC.COM.

Class 3 Femto Fits Broader Apps

The PC8219E from picoChip is the world's first Class 3 femtocell reference design, bringing femtocell technology to campuses, rural areas, or "metrozone" hotspots, according to the company. The turnkey solution builds on picoChip's field-proven PC8208 and 8209 physical layers (PHYs) to provide a complete extended-reach HSPA femtocell baseband.

Also known as "greater femtocells" or "superfemtoms," these mobile cells resemble the 3GPP local-area basestation or traditional picocells while adding the femtocell's capabilities to use standard backhaul and to self-configure for interference management. The Femto Forum recently standardized femtocells into Class 1 (typically residential), Class 2 (primarily indoor for enterprise), and Class 3 (rural, metro, and wider-area deployment).

The design's eight-user capacity, 2-km range, and support for vehicular mobility suit it for low-cost, wide-area open-access femtocell deployments where carriers need to cost-effectively enhance coverage and capacity, picoChip says. The PC8219E also provides a seamless migration path to picoChip's PC3xx picoXcell SoCs, enabling manufacturers to move beyond the residential market and into outdoor applications, the company says.

The PC8219E offers self-configuration features and backhauls via the Internet. It also features industry-standard FAPI and FRMI interfaces, as defined by the Femto Forum, and fully compliant security functions. And, its network monitoring function enables the femtocell to reconfigure itself to behave like a handset receive chain, synchronizing with a macro-basestation nearby, improving network planning and providing the basis for SON functions. ■

MD&D News Staff

picoChip • www.picochip.com

TECH FEATURE BY CHRISTOPHER (CHRIS) BERGEY, *DIRECTOR, EMBEDDED WLAN BUSINESS, BROADCOM CORP.*

COMBO CHIPS PACK A PUNCH

MULTIPLE RADIOS PER
CHIP KEEP SMART PHONES
MORE IN TOUCH.

The ongoing convergence of communications technologies and proliferation of digital media is introducing radical changes to the consumer electronic market. These changes are redefining our traditional ideas of what we can expect from familiar products, such as televisions, PCs, and cellular handsets.

Advances in semiconductor technology are driving this transformation by bringing capabilities we are already accustomed to using such as Web browsing, recording video, and getting driving directions into new device contexts. Mobile handsets are a good example of this trend, with the newest models providing advanced multimedia and Internet features that were previously limited to other devices.



Christopher (Chris) Bergey

The key to this convergence is the ability for mobile devices to connect to multiple networks, including those powered by Wi-Fi, Bluetooth, cellular, and other radio technologies. These connectivity options greatly extend the usefulness of a mobile phone by enabling commerce and communication (via high-speed Internet access), delivering real-time sports and news broadcasts, and extending their interfaces with wireless headsets and other peripheral devices. Each radio technology performs a specific func-

tion, but the sum represents a significant transformation of the role of these devices in our lives.

WI-FI IN MOBILE DEVICES

While Bluetooth is already a mainstay feature of mobile phones, Wi-Fi is a relative newcomer to these devices. But with the skyrocketing demand for mobile data, location-based services, and multimedia content on any device, wireless carriers and consumers are now seeing significant value in having Wi-Fi on the handset.

For mobile users, Wi-Fi provides a high-speed link to the Internet and its endless array of digital music, video, and games. But since most consumers won't pay much for content that is confined to a single device, tying the mobile phone (and its contents) into the larger Wi-Fi ecosystem makes sense. Imagine downloading songs onto your phone while traveling and adding them to the music library on your PC when you arrive home or transmitting photos and videos between your phone and television.

For cellular carriers, Wi-Fi is a technology that can offload data traffic from a 3G network, which frees up bandwidth and reduces the cost of adding infrastructure to support the growing number of customers looking to use these new applications. Additionally, it can turn a wireless handset into a multimedia center, spurring new usage models and revenue streams for service providers.

The additional bandwidth and coverage of the new 802.11n standard will enable even more multimedia applications on mobile devices. This will accelerate Wi-Fi's transition from high-end smart phones into media-centric mid-range phones. It also is expected to drive Wi-Fi attach rates from 10% of phones in 2009 to 20% by 2012, according to ABI Research.

COMBO CHIPS: A WINNING APPROACH

Given the growing demand for Bluetooth, Wi-Fi, and other connectivity technologies in mobile devices, manufacturers are looking for ways to add these features in smaller and smaller products. However, adding

multiple radios to mobile phones and other compact devices brings several design challenges—more cost, more drain on battery life, more space, and more radio interference.

Just as various wireless technologies are converging to meet new consumer demands and create new usage models, chip companies are bringing them together at the silicon level to address the technical challenges presented by wireless convergence. Rather than supplying several discrete components, chipmakers are now integrating multiple wireless technologies such as Wi-Fi, Bluetooth, FM radio, and GPS onto a single die. Such “combo chips” offer significant advantages that overcome the challenges of designing small mobile devices with the latest connectivity features.

Because of these advantages, IDC predicts that such combo chips will account for nearly two-thirds of all wireless connectivity solutions shipped into mobile phones by 2012, demonstrating the strength of this approach (*see the figure*). Manufacturers evaluating discrete wireless so-

lutions versus combo chips must consider performance, coexistence and interference, component size and cost, antenna placement, and power management.

PERFORMANCE

To compete in the cut-throat handset market, vendors are constantly striving to offer the latest features and a better user experience. Both of these factors are critical to attracting new customers and maintaining brand loyalty. If a wireless feature fails to work as expected, consumers will become frustrated and may stop using the feature altogether—or worse yet, switch to another handset brand.

When adding multiple wireless technologies to a mobile handset, manufacturers will not settle for subpar performance. New devices must perform as well as or better than previous generations. Since the Bluetooth and Wi-Fi technologies are constantly evolving, integrating the most advanced features into combo chips is an arduous task. Therefore, handset makers must look for silicon vendors that not only

have well-rounded wireless portfolios, but also those with a proven track record of combining technologies for mobile designs.

COEXISTENCE AND INTERFERENCE

Multi-radio coexistence is also critical to ensuring the best possible user experience for devices with Wi-Fi and Bluetooth. Since both technologies operate in the 2.4-GHz frequency band, concurrent transmissions can severely degrade performance and render both radios useless. Although Bluetooth uses an adaptive frequency-hopping (AFH) scheme to mitigate radio interference in the 2.4-GHz band, AFH is insufficient when there is little isolation between the Bluetooth and Wi-Fi radios—as is the case in a handheld device.

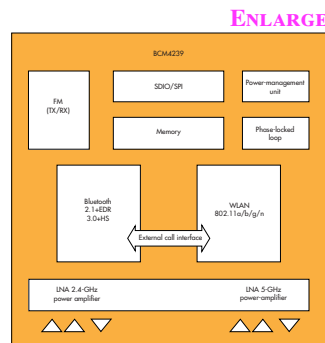
The coexistence problem is even worse when both radios are found on the same silicon die. To mitigate interference in close proximity, most chipmakers employ a standard three-wire coexistence interface between the Bluetooth and Wi-Fi chips. However, cutting-edge vendors have de-

veloped unique algorithms and hardware mechanisms that intelligently manage the 2.4-GHz band. This advanced approach is used to synchronize transmissions, avoid collisions, and find the clearest channel and time slot for Bluetooth and Wi-Fi operation. As a result, today's combo chips can provide better performance than discrete solutions.

COMPONENT SIZE AND COST

As mobile designs get smaller and less expensive, the size and cost of every component is critical. Wireless combination chips not only are smaller than multiple standalone chips, they also require fewer external components to complete the system.

For example, discrete Wi-Fi and Bluetooth systems typically require about 200 components, including power amplifiers, baluns, and low-noise amplifiers. Combo solutions can cut that number to 40 by sharing many of the redundant components between the Bluetooth and Wi-Fi systems and integrating others on-chip.



Broadcom's BCM4239 combo chip combines 802.11n, Wi-Fi, Bluetooth, and an FM radio. The chip is unique for its integrated CMOS power amplifiers.

When you map these components to a board layout, the footprint of the discrete solutions is approximately 200 mm² of board area, compared to 75 mm² for the combo chip. The smaller number of components also reduces the bill-of-material cost for manufacturers.

One semiconductor supplier has integrated high-power CMOS power amplifiers into its combo chip, which eliminates the cost of an external power amplifier without sacrificing the system's performance. Innovations like these will continue to make it more cost-effective for handset makers to add combo chips to multiple phone categories.

ANTENNA PLACEMENT

With multiple radio technologies come multiple antennas. In addition to one or more cellular antennas, today's more advanced handsets must accommodate separate antennas for Bluetooth, Wi-Fi, FM, and GPS. This adds to the system cost and poses considerable challenges for board layout. Some combo chips can help to alleviate these challenges by sharing an antenna system between the Bluetooth and Wi-Fi radios.

POWER MANAGEMENT

The more components on the board, the more power it consumes and the more heat it generates—all factors that impact battery life. Combo chips require fewer components, reducing overall power consumption. But even more important is the process technology that chipmakers use when designing combo chips. The leading vendors are using the 65-nm process node, which enables greater efficiency, tighter silicon integration, and lower power consumption. As a result, manufacturers can

add Wi-Fi and Bluetooth to their devices without concerns over unacceptable battery life.

To further address the complex power requirements of mobile handsets and other portable devices, some combo chips integrate a power-management unit (PMU) to monitor usage patterns and optimize system operation to maximize battery life. For example, intelligent "sleep" and "wake" modes can power down components to minimize wasted power when not in use.

Some PMUs are offered with a complete set of software and device drivers to enable the integrated linear and switching regulator output voltages to be programmed, or for startup sequencing, providing a fast and efficient correlation between the power source and integrated components.

SUMMARY

Driven by the functional consolidation in mobile devices, combo chips are the next big wave of semiconductor design. Such highly integrated solutions offer lower power, a smaller footprint, more cost-effective

design options, and better performance than discrete wireless solutions, making them ideal for portable devices like mobile phones.

As these mobile devices become more media-centric, consumers will demand more connectivity features that enable them to access, enjoy, and share digital content among devices. To meet this demand, device manufacturers are looking to the leading chipmakers to provide combo solutions that reflect this new reality. ■

CHRISTOPHER BERGEY IS THE SENIOR DIRECTOR OF MARKETING FOR BROADCOM'S WIRELESS CONNECTIVITY BUSINESS UNIT, WHERE HE IS RESPONSIBLE FOR DRIVING THE COMPANY'S WI-FI PRODUCTS INTO MOBILE DEVICES. CHRIS MANAGES THE GO-TO-MARKET STRATEGY AND BUSINESS DEVELOPMENT EFFORTS OF BROADCOM'S EMBEDDED WLAN TEAM AND OVERSEES THE DEVELOPMENT OF SOLUTIONS THAT COMBINE WI-FI WITH OTHER WIRELESS TECHNOLOGIES, INCLUDING BLUETOOTH AND FM. HE EARNED AN MBA FROM THE UNIVERSITY OF MARYLAND AND A BACHELOR OF SCIENCE DEGREE IN ELECTRICAL ENGINEERING FROM DREXEL UNIVERSITY.

NEW PRODUCTS BY THE MD&D NEWS STAFF

DOWNCONVERTING MIXERS CUT POWER AND IMPROVE PERFORMANCE IN 4G BASESTATIONS

The LTC554x family of down-converting mixers from Linear Technology offers high dynamic range and covers the 700-MHz to 4-GHz wireless infrastructure frequency range. They also offer a 26-dBm input third-order intercept (IIP3), 9- to 10-dB noise, and 8-dB conversion gain for excellent dynamic range performance for main receivers and digital predistortion receivers, according to the company.

Furthermore, Linear says that the LTC554x family provides best-in-class capability to maintain a low noise figure in the presence of strong blocking interferers, as well as significantly enhance receiver sensitivity and robustness. Unlike other mixers in their class, these devices operate from a



single 3.3-V supply without compromising performance while reducing power consumption by 34% compared to the closest competing solution, the company says.

The LTC554x mixers are designed to satisfy the requirements of nascent fourth-generation Long-Term Evolution (LTE) cellular and WiMAX basestations as well as 3G CDMA, WCDMA, TD-SCDMA, UMTS, and GSM/EDGE platforms.

Their robust performance also enhances other wireless

systems such as point-to-point microwave systems, cellular repeaters, public safety radios, and military communication systems.

Additionally, the mixers pack an integrated IF amplifier, LO buffer, LO switch, and RF balun transformers. Each mixer's RF input is single-ended, 50-Ω matched. Two single-ended LO inputs with high isolation are provided for frequency-hopping applications. Each LO input is also single-ended, always 50-Ω matched regardless of whether the mixer is active or powered down to avoid unlocking of the phase-locked loop (PLL). The LO input requires only 0-dBm drive level. All of these features facilitate a compact solution with minimal external components.

The mixers also have identical pinouts, so design-

ers can share printed-circuit board (PCB) layouts across multiple platforms operating in different frequency bands. This helps users reduce total ownership costs and accelerates time-to-market. The pinouts are similar to common industry footprints and pinouts for ease of adoption while improving performance and reducing power consumption.

Drawing a supply current of 200 mA, the LTC554x devices have a power-down feature with turn-on and turn-off time of 2 μs and 3 μs, respectively. When disabled, the ICs consumer a maximum of 500 μA. They come in a 20-lead, 5- by 5-mm quad flat no-lead surface-mount package. Production will begin in November. Sampling now, production quantities will be available by February 2010. Pricing

for the LTC5541 starts at \$6.50 each.

Linear Technology
www.linear.com

BLUETOOTH CHIPSET IMPROVES AUDIO QUALITY AND SAVES POWER

The fourth-generation BCM2074x systems-on-a-chip (SoCs) from Broadcom are designed to save power and improve audio quality for Bluetooth headsets. These 65-nm CMOS chips also include wind noise reduction algorithms and multi-language "voice prompt" technology. And, their integrated fast-charging systems enable headsets to charge five times faster than existing products, Broadcom says.

Driven by the company's SmartAudio technology, the BCM2074x chips reduce background noise by nearly 40% compared to existing noise cancellation techniques, Broadcom says. The SmartAudio upgrades include dynamic wind noise suppression and near-end speech enhancement algorithms such as dynamic compression and spectral

shaping that overcome challenging and annoying audio interferers.

According to Broadcom, headsets based on the BCM2074x platform also can provide more than four hours of talk time after a five-minute charge, while older and competing technologies only deliver 30 minutes or less after a similar charge. In addition, the company says, the platform doubles the overall talk time of other devices.

Further, an integrated voice prompt decoder enables users to hear multi-language voice prompts in basic and advanced modes, providing information about headset pairings, battery life, muting, and multipoint status and simplifying the user interface. The BCM2074x devices improve the pairing experience as well, in basic and advanced cases, including multipoint options.

The BCM2074x family supports Bluetooth versions 2.0, 2.1, and 3.0. Each chip provides all of the major functional blocks required for a mono headset, including the power-management unit, a fast-charge capable charger, and audio codecs. The BCM20740 (single microphone), BCM20741

(single microphone with Smart-Audio), and BCM20742 (dual microphone) are sampling now to early access customers.

Broadcom Corp.
www.broadcom.com

SIGNAL AND SPECTRUM ANALYZER OFFERS NEW FUNCTIONS

Equipped with the company's FSV-K70 vector signal analyzer application, the Rohde & Schwarz FSV signal and spectrum analyzer demodulates digitally modulated signals down to the bit level. This option addresses users in development and manufacturing who work with digitally modulated RF signals.

According to R&S, the user interface is designed for best ease of use. In combination with the touchscreen, the block-diagram operation makes the vector signal analysis of complex signals an easy task, the company also says. Available predefined standards include



GSM, GSM/EDGE, WCDMA, and TETRA.

The FSV-K76 and FSV-K77 measurement applications are designed for TD-SCDMA. Code domain power and modulation accuracy measurements can now be performed in the same manner as with WCDMA or cdma2000. Customers and applications include basestation and repeater manufacturers for R&D and production, network operators for quality approval tests, and chipset and user equipment manufacturers for R&D and quality assurance.

The FSV-K7S option enhances the FVS-K7 analog AM/FM/PM demodulator option with measurements on FM stereo transmitters. An integrated stereo decoder measures the deviation of the left and right channels, of the pilot, and of the RDS carrier. Signal-to-noise ratio, crosstalk, and distortion measurements are easy to perform. The various audio components of the stereo signal can be further analyzed with displays in the time domain or as a spectrum.

The FSV-K14 option adds a spectrogram display and trace recording function to the FSV spectrum and signal analyzer for the analysis of intermittent signals or interferers. With the FSV-B21 option, external harmonic mixers such

as the FS-Z60/75/90/110 can be connected to the FSV30/40 to extend the frequency range up to 110 GHz.

The FSV-K9 power sensor measurements option now supports the NRP-Z56 and NRP-Z57 power sensors. The FSV-K10 option has been enhanced with dedicated filters for measurements in a GSM multi-carrier environment. And, new functions for the FSV base unit include an I/Q analyzer mode for the time and frequency display of captured I/Q data, new functions for emulating legacy instruments, and a CCDF that can be internally triggered on pulsed signals.

Rohde & Schwarz
www2.rohde-schwarz.com/en/

IF SAMPLING SUBSYSTEM TAKES THE PAIN OUT OF BASESTATION RECEIVER DESIGN

One of the trickiest parts of basestation design is the interface between the RF front end (low-noise amplifier, mixer, filter) and the intermediate frequency (IF) section where the analog-to-digital converter (ADC) resides. National Semiconductor's SP16160CH1RB IF sampling receiver subsystem

RFMD. RF2815

GPS Low Noise Amplifier with Integrated Filter

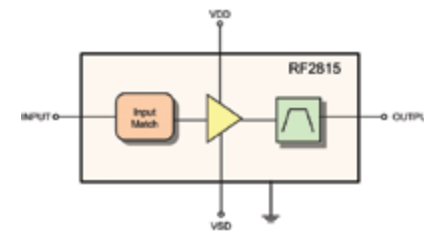


The RF2815 is a high-performance low noise amplifier (LNA) module with integrated cellular and PCS band filtering. Developed for use in GPS receivers, this module provides an excellent combination of low noise figure, high gain, high linearity, and low power consumption which is ideal for battery-operated GPS solutions. Featuring a low external component count and compact package, the RF2815 is optimal in terms of both solution size and performance.

SPECIFICATIONS

Parameter	High Current Mode	Low Current Mode	Low Operating Voltages			Unit
			V _{DD} = 2 V	V _{DD} = 1.5 V	V _{DD} = 1 V	
Gain (G)	13.5	12.5	14	13.5	11.5	dB
Noise Figure (NF)*	0.85	0.95	0.85	0.95	1.1	dB
Input P1 dB Compressed Power (IP1 dB)	-3	-3	-2	-4	-6	dBm
Input 3rd Order Intercept Point (2-tone at fc±/ 2.5 MHz)	8	6	10	7.5	3	dBm
Input Return Loss (S11)	-8	-7	-9	-8	-7	dB
Output Return Loss (S22)	-13	-11	-13.5	-12.5	-11	dB
Reverse Isolation (S12)	-24	-24	-24	-24	-22	dB
Cell Band Rejection (Relative to 1575 MHz at 827.5 MHz)	54	55	52	52	52	dBc
PCS Band Rejection (Relative to 1575 MHz at 1885 MHz)	45	44	45	45	45	dBc
R2	3 K	3 K	1.5 K	1.5 K	1.5 K	ohms
VSD	2.6 V	1.67 V	2 V	1.5 V	1 V	V
DC Supply Current at Shutdown (SD) Voltage VSD = 2.85 V (IDD)	8	4.5	10.5	7.3	4	mA
ISH (Shutdown Current)	0.1	0.1	0.1	0.1	0.1	uA

*Noise Figure Data has not been de-embedded



FEATURES

- Low noise figure: 0.85 dB (Typ)
- High gain: 13.5 dB (Typ)
- High IIP3: +8 dBm (Typ)
- Operable over wide supply voltage range: 1 V to 3.6 V
- CMOS compatible shutdown function (<0.1 uA)
- Current tunable via single resistor
- No external DC blocking capacitor required at the output—lowest BOM cost and small solution size
- Compact footprint: 3.3 x 2.1 x 1.0 mm
- Ideal for cellular and non-cellular GPS receiver applications

For sales or technical support, contact RFMD at 336.678.5570 or sales-support@rfmd.com
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This product complies with RFMD's green packaging standards.

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addresses this problem. Designed for Long-Term Evolution (LTE) and WiMAX basestations, it also works great in current WCDMA and GSM/EDGE systems.

Additionally, the SP16160CH1RB may be useful in the feedback receiver path in power amplifiers using the digital pre-distortion approach. Its reference design kit provides everything you need to design a high-performance receiver, including a reference design board, software, schematic, bill of materials, and Gerber files, shortening your design cycle.

The subsystem's IF chain's -105 -dBm sensitivity means greater basestation capacity and coverage. It also has a carrier-to-noise (C/N) of 9 dB in a 200-kHz channel. The IF is 192 MHz. And, the input digitally controlled variable gain amplifier (DVGA) has a maximum gain of 22 dB.

The SP16160CH1RB IC packs the dual-channel ADC16DV160 16-bit, 160-Msample/s pipeline ADC, the dual-channel LMH6517 DVGA, and the LMK04031B clock jitter cleaner. The device's overall performance is due to the high dynamic performance

of the ADC, the low noise and high linearity of the DVGA, and the ultra-low rms jitter of the clock jitter cleaner.

The ADC16DV160 ADC provides a signal-to-noise ratio (SNR) of 76.3 dBFS and spurious-free dynamic range (SFDR) of 91.2 dBFS at 192-MHz input IF. The LMH6517 DGVA boasts a noise figure of 6 dB and output third-order intercept point (OIP3) of 45 dBm. The LMK04031B clock jitter cleaner delivers near 150 fs of rms clock jitter. The device runs on a single 5-V supply.

To simplify evaluation of the SP16160CH1RB, National's WaveVision 5.1 data capture board and WaveVision 5 software enable data capture and analysis, as well as complete programmable configuration of the ADC16DV160 and LMH6517 via a common serial peripheral interface (SPI) bus. The SP16160CH1RB board includes a programmable interrupt controller (PIC) loader board for configuring the LMK04031B.

The SP16160CH1RB subsystem reference design kit costs \$995.

National Semiconductor Corp.

www.national.com/rld/RDhtml/RD-179.html

www.national.com/comms

1.8-A STEP-DOWN CONVERTER ENABLES MAXIMUM CLOCK SPEEDS

Housed in a 4-mm² wafer-level package (WLP), the MAX8649 dc-dc step-down converter from Maxim Integrated Products integrates a highly precise bandgap reference and minimizes offset errors in the feedback circuit for extremely tight output-voltage accuracy, the company says. Its fully differential remote sense ensures precise regulation at the load by eliminating the resistive losses associated with printed-circuit board (PCB) trace impedance, Maxim also says.

This 1.8-A, synchronous, fixed-frequency device delivers an initial accuracy of $\pm 0.5\%$ at 1.27 V and a total accuracy of better than $\pm 2\%$ over load, line, and temperature, enabling applications processors to run at maximum clock speed and suiting the MAX8649 for high-perfor-



mance portable handsets. It operates from an input supply as low as 2.5 V to support the latest generation of deep-discharge battery chemistries. And, its I²C interface allows the output voltage to be programmed between 750 mV and 1.38 V in 10-mV steps.

The MAX8649 also can operate in fixed-frequency (3.25 MHz) pulse-width modulation (PWM) mode or in power-save mode. It can be configured to operate from the internal oscillator, or it can be synchronized to an external system clock to simplify electromagnetic interference (EMI) reduction. In power-save mode, the MAX8649's proprietary hysteretic PWM control scheme reduces the effective switching frequency for improved light-load efficiency (80% at 10 mA) compared to fixed-frequency PWM mode (21% at 10 mA).

To simplify program-

ing, the MAX8649's two logic controls facilitate selection between four predefined power-management states. For each state, users can individually program the output voltage, mode of operation (PWM or power save), and external clock synchronization (on/off). Other features include output over-voltage and overcurrent protection, thermal shutdown, soft-start, and an ultra-low, 1- μ A shutdown current.

The MAX8649 comes in a 2.0- by 2.0- by 0.65-mm, 16-bump WLP. It's fully specified over the -40°C to 85°C extended temperature range. Prices start at \$1.60 in quantities of 1000 units and up. Samples and evaluation kits are available upon request.

Maxim Integrated Products
www.maxim-ic.com

PWM REGULATORS TARGET INTEL MOBILE CPUS

The Intersil ISL62882 and ISL62883 compact multiphase pulse-width modulation (PWM) regulators comply with the Intel Mobile Voltage Positioning (IMVP-6.5TM) specification. According to the company, they also reduce total

component cost and implementation footprint for a range of Intel-based mobile handsets, notebooks, network systems, and embedded designs, including the Capella platform based on the Ixex Peak-M chipset.

Each regulator supports various CPUs using programmable three-phase, two-phase, or one-phase operation. Configurable overshoot reduction capabilities provide minimal V_{OUT} overshoot, which pre-empts voltage misreadings and the potential for product underperformance or failure. Both devices also feature phase dropping, diode emulation, adaptive body diode conduction time reduction to optimize light load efficiency, and FB2 (full buffering) to optimize transient response and Z(f) in one-phase mode. And, the ISL62882 provides a split LGATE function that further improves efficiency.

To reduce total output voltage ripple, the converters apply interleaved phases. Each phase carries part of the load current, which optimizes system performance, efficiency, and thermal management. The PWM modulator is based on Intersil's Robust



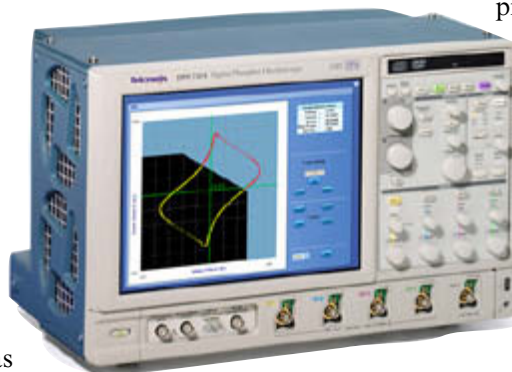
Ripple Regulator (R3) Technology, which commands variable switching frequency during load transients, achieving faster transient response than traditional modulators, Intersil says. With the same modulator, the switching frequency is reduced at light load, increasing the regulator efficiency.

The ISL62882 and ISL62883 are available now in compact 40-lead quad flat no-lead (QFN) packages. Prices start at \$3.93 each in 1000-unit lots.

Intersil
www.intersil.com

OSCILLOSCOPES SUPPORT MIDI D-PHY STANDARD

The DPO7000 series of oscilloscopes from Tektronix Inc. now supports the Mobile Industry Processor Interface (MIPI) D-PHY standard. These devices also now include UART/RS-232 protocol analysis software as well as



four passive probes and three analysis tools as part of their standard configurations.

According to Tektronix, manufacturers of wireless mobile devices are using the MIPI D-PHY specification more as the communications bus across main components such as embedded controllers, cameras, and displays. It can reduce time-to-market and device integration costs while taking advantage of richer feature sets with higher bit rates.

The Tektronix MIPI solution, Option D-PHY, includes an automated setup library for DPOJET jitter analysis software that includes complete real-time scope measurements listed in the latest D-PHY conformance test spec (CTS). The solution also includes methods of implementation (MOI) for testing the D-PHY standard.

Compared to other, more limited alternatives, Tektronix says, this solution enables

users to perform a full range of tests from verification and pre-compliance testing to more in-depth characterization, with custom limits. The test reports provide comprehensive details of numerous parameters in each measurement. Also, the solution is scalable for an early start on next-generation MIPI standards such as M-PHY.

With the DPO7000 triggering capabilities for RS-232 and the new UART/RS-232 Protocol Analysis Software (PDU-R), the company says, engineers can quickly link decoded data to captured waveforms by selecting data in a result table. This can save significant time for debug and verification tasks tied to these popular legacy standards.

The three analysis tools include Waveform Limit Test, Advanced Search, and Mark and Jitter Essentials. Tektronix says that it is the first Windows-based oscilloscope vendor to provide these tools and the four passive probes as part of a standard offering. The MIPI D-PHY and UART/RS-232 options are available now for the DPO7000 and DPO/DSA70000B series. The MIPI solution is available on the MSO70000 series as well.

Tektronix



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