



CALYPSO WIRELESS INC.

WHITE PAPER

SEAMLESS SWITCHING OF WI-FI AND CELLULAR FOR VOICE, DATA AND REAL-TIME VIDEO CONFERENCING SERVICES.

Table of Contents:

Introduction.....	2
Background	2
Current state of cellular and WLAN technologies.....	2
Value proposition to end-users, public or private WLAN owners, ISPs, and Mobile Carriers.....	4
How Calypso’s technology is implemented on the networks	5
3G Bandwidth Dilemmas.....	6
Calypso’s ASNAP™ and 3G.....	7
How Calypso’s ASNAP™ Works.....	8
Calypso’s ASNAP™ Applications.....	11
Competition from VoIP PDAs.....	12

Introduction:

Over the past few years, the growth of the Internet and telecommunications industries has created a hunger on the part of the end user for faster and easier technology solutions at reduced costs. The telecommunications industry itself has created expectations of faster data delivery to cellular handsets by touting yet to be delivered 3G technologies such as WCDMA and CDMA2000. Even with such expectations remaining unfulfilled, the telecommunications industry remains extremely competitive. This competitiveness would continue to reduce product and service margins substantially if it were not for innovation. Recent innovations can be seen in new cellular phones with slow Internet capability and cameras that take pictures which can be sent to friends. Other innovations can be seen in the growth of WLAN public and private hot spots, where laptops and PDA's that can access those networks are able to surf the web at very high speeds. These innovations, though they are good, still fall short of the expectation of the end user and do not do much to improve sales for the OEMs nor revenue for the service providers. However, it is these latest developments that are creating an environment that is more conducive toward the convergence of Cellular and Wi-Fi services for both data and voice. **It is this convergence that is at the heart of Calypso's revolutionary ASNAP™ technology.**

This White Paper explains how the evolution of the different wireless technologies has created a platform for the implementation of Calypso's ASNAP™ technology. Here you will learn why the seamless switching of cellular and Wi-Fi makes sense from both a business and technology perspective. And finally, you will also learn how Calypso's ASNAP™ technology works, how it will be implemented and spread throughout the entire wireless industry. From the end-user's perspective, Calypso's ASNAP™ will provide uninterrupted connectivity with fewer dropped calls, access to new services such as real-time video conferencing, increased wireless bandwidth from the present 9.6 Kbps to 11 Mbps and greater, and potential worldwide mobility via wireless VoIP network connectivity.

Background:

Current state of cellular and WLAN technologies:

The telecommunications industry has come to realize that Wi-Fi represents great opportunities for the wireless carriers. As Wi-Fi networks get installed in more and more homes, enterprises and public hot spots, the benefits of converging cellular and Wi-Fi become ever greater. Although most services on Wi-Fi networks are internet data centric, voice over Wi-Fi presents the greatest opportunity to mobile carriers. Presently, Wi-Fi networks provide wireless Internet connectivity through "hot-spots" located at airports, restaurants, coffee shops, such as Starbucks, or through Private Enterprises, (homes or offices).

The ability to enable voice over Wi-Fi will create a new opportunity for mobile carriers to increase their revenue base while providing additional value added services to customers. Note that the greatest source of revenue to mobile carriers comes from voice usage.

The mobile carriers' networks are composed of wide area radio signals generated from cellular towers centrally controlled at the mobile carrier's switching center (MSC). As part of the network, numerous servers are providing such functions as: authentication, authorization and accounting as well as call-related features specifically configured for each user account, as well as the Broadband Wireless connectivity at 11 Kbps or greater for a host of possible new applications for end-users.

Wi-Fi networks are short range radio access networks that are license exempt. With Calypso's technology they can be utilized by a wireless carrier's existing core network as a conduit for extending the services of the core network to locations served by the Wi-Fi network. With Calypso's technology, Wi-Fi networks such as private enterprises or home networks can be tied into the mobile carrier's network seamlessly via the Internet.

Cellular technology, by today's standards, is "slow". There is limited radio frequency spectrum available to be used for voice and data. The existing technology is limited by the number of channels (or users) that can be simultaneously connected. This number of connections is greatly reduced when the service is also supporting wireless Internet data services. Since the greatest source of revenue for service providers comes from voice services, the carrier's allocated spectrum for data is kept small causing the data rates to be slow. This situation will be improved when additional spectrum is allocated for voice and data and new 3G technologies are introduced. However, the data rates for short-range radio, such as Wi-Fi will always be greater than the data rates that will ever be delivered over wider area cellular networks.

With Calypso's technology in the handset and the network, a Wi-Fi /Cellular enabled mobile phone subscriber is able to roam into any Wi-Fi coverage area and establish service with their wireless carrier's core network. The subscriber's call-related features such as authentication, call waiting, mobile messaging, voicemail and message waiting indicator, are extended seamlessly from the cellular network to the Wi-Fi network via Calypso's Media Gateway Controller.

For the mobile carriers, the delivery of mobile telecommunication services over license exempt Wi-Fi networks will result in substantial cost reductions by allowing them to provide wireless services to more subscribers without having to purchase additional radio frequency spectrum or install additional cellular towers. It would be safe to assume that by reducing the carriers costs of operations, the savings would be passed on to the consumer, thus making the use of Wi-Fi networks attractive for both the mobile carrier and the consumer alike.

Value Proposition:

Calypso's ASNAP™ (Automatic Switching of Network Access Points) will assist mobile carriers in achieving an efficient allocation of resources by freeing a broad area of cellular spectrum space for data and voice, and increasing the availability of bandwidth to other users.

Calypso Wireless is marketing and licensing its proprietary switching technology. This propriety technology is the convergence of Cellular and Wi-Fi networks, which will make it possible for wireless users to roam between their Wi-Fi zones and their mobile phone carrier networks, in a seamless manner.

Calypso's ASNAP™:

- Enables mobile users to seamlessly switch between cellular and wireless IP networks via WLAN, accelerating wireless broadband deployment.
- Will save carriers billions of dollars in additional frequency spectrum and infrastructure equipment by offloading capacity to the WLAN and IP networks while increasing their revenues.
- Will seamlessly connect Internet ready devices – such as wireless phones, PDA's and notebooks – incorporating ASNAP™ technology, to either a cellular phone network or a wireless LAN, such as 802.11b, (Bluetooth or others). In this way, global connectivity of voice, video, and data will be done through the most efficient connection point, at a lower cost to both the mobile operator and the consumer.
- Assists carriers to comply with FCC “E911” mandate. In conjunction with current efforts by the cellular carriers to locate users via cellular triangulation techniques, ASNAP™ is able to locate the user by the IP address of the wireless device's connection point. Thus complying with FCC regulations.
- The benefits to end-users who are WLAN owners will include revenues from mobile carriers for calls and data routed through their WLAN Access Points. Private Enterprise WLAN owners can seed business patronage by making available unused excess bandwidth to any ASNAP™ mobile device user.

PRESENT CELLULAR PROBLEMS AND ASNAP™ SOLUTIONS:

CURRENT PROBLEMS OF CELLULAR NETWORKS

LACK OF BROADBAND CAPACITY

- Existing mobile networks are not designed to meet the needs of the new advanced web and digital devices. Network capacity is limited by the available spectrum due to the huge cost of additional infrastructure build-out.
- Technological complexities associated with 3G are substantially delaying its launch. ASNAP™ technology will therefore improve the performance and quality of future 3G networks by taking the heat off of a crowded spectrum.

COVERAGE PROBLEMS

- The cellular networks have two types of coverage problems:
 1. The "holes" in the network: caused by weak signals placing the user out of range, a problem often exacerbated when within buildings.
 2. Cell overflow: caused by exceeding cellular site capacity.
- These coverage problems lead to dropped calls, limited service availability, and other inconveniences for consumers.

ASNAP™ SOLUTION

- Mobile phone seamlessly synchronizes with the mobile carriers' mobile switching center (MSC) to route the call (or data) from the cellular base switching center (BSC) to the local WLAN or a stand- alone IP wireless transceiver, solving both coverage problems while increasing bandwidth.

Calypso Wireless Confidential Proprietary

Table 1

THE CURRENT 2G, AND PLANNED 3G CELLULAR SYSTEMS ARCHITECTURE IS GENERICALLY REPRESENTED AS FOLLOWS:

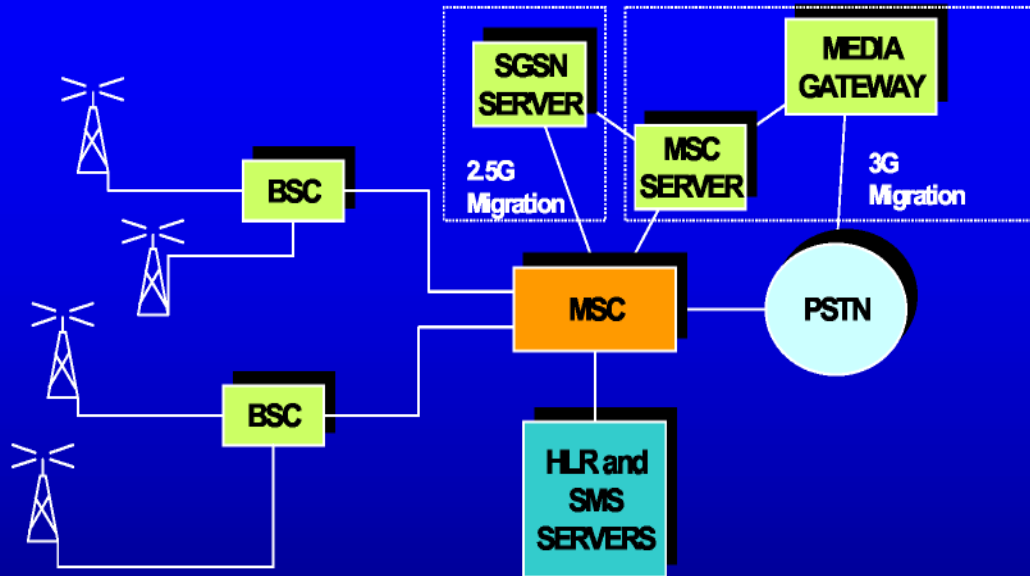


FIGURE 2

The Mobile Switching Center (MSC) controls the radio traffic from the Base Station Controllers (BSC) while providing a contact point within the mobile network and other external networks (ie. PSTN). The MSC is supported by various servers such as the Home Location Register (HLR) and Short Message Service (SMS) server. In most GSM networks, Media Gateways using H.248 protocol are being introduced to handle GPRS (General Packet Radio Service) via the SGSN (serving GPRS service node) server.

3G-Migration includes the costly introduction of new tower antennas, transceivers, BTSs, MSCs (IP rather than circuit switched), plus various Media Gateways to interface legacy systems and add new services. The carrier will also have to purchase additional 3G spectrum.

Calypso Wireless Confidential Proprietary

HOW CALYPSO'S TECHNOLOGY IS IMPLEMENTED ON THE NETWORKS:

The figure above represents superimposing the planned 3G Technology onto the current state of 2G cellular technologies.

The United States lags far behind Europe and Asia in the race for 3G. Spectrum licenses for 3G have been auctioned off and sold for billions of dollars. German Licenses sold for \$45 billion and U.K licenses sold for \$33 billion respectively. That's more than the United States has collected so far on all its auctions combined. The implication of this is that mobile carriers in the U.S. will have to spend billions of dollars up-front just to bid for spectral "real estate" needed to implement 3G Networks.

3G BANDWIDTH DILEMMAS:

There is no doubt that the successful implementation of 3G is expected to enhance the U.S. economy by providing opportunities for telecommunication manufacturers, mobile wireless operators, Internet Service Providers, retail businesses, and consumers alike. There is still some delay however beyond everyone's control. The delay is largely due to allocating the 3G bandwidth to operators. Based on models used by the International Telecommunications Union (ITU) the FCC estimated that approximately 300 MHz to 420 MHz of spectrum would be required within the United States for 3G services. Another 120 MHz to 240 MHz of spectrum has also been projected by the industry as needed to meet future needs.

The portion of spectrum that is being considered for allocation for 3G services is currently owned and being used by the Department of Defense, whose spectrum needs are strategic due to military actions around the world, from Eastern Europe, Mid-East, Iraq, Afghanistan, and U.S. (Homeland Defense). The Federal Government currently uses the 1710-1770 MHz bands, while the 2110-2170 MHz band is currently used by the private sector. The plan is that the 2110-2170 MHz band can be used for the base station part of 3G and the 1710-1770 MHz band for the handheld mobile units. It is being strongly considered that the industry has to foot the bill associated with relocating Strategic Federal services within the 1710-1770 MHz band, a potentially huge costly proposition, on top of paying for spectrum and the building out of new infrastructure by mobile operators.

Meanwhile, Calypso's ASNAP™ presents opportunity for mobile carriers and ISPs to increase their number of subscribers by providing them new features and applications through the efficient use of bandwidth layout, **without additional infrastructure costs.**

CALYPSO'S ASNAP™ AND 3G:

Industry watchers have raised some concerns that Calypso's ASNAP™ will be less viable if and when 3G is rolled out. However, the fact remains that regardless of the deployment of 3G, the need for more applications will continue to evolve. More applications will increase the burden on existing bandwidth, especially with more users being added and being allocated scarce radio resources for things such as video streaming, real time two-way video conferencing, convergence of TV and computer programming, movies on computers, PDA's and cell phones, security, etc, etc. Calypso's ASNAP™ will occupy a niche of its own in taking the heat off and relieving the pressure of a crowded spectrum, to allow for a more efficient realignment and reallocation of scarce bandwidth. This will make the overall system less chaotic, the operations run smoothly and efficiently and eliminate capital replacement costs to the operators.

HOW CALYPSO'S ASNAP™ WORKS.

A generalized Calypso's ASNAP system architecture is presented below:

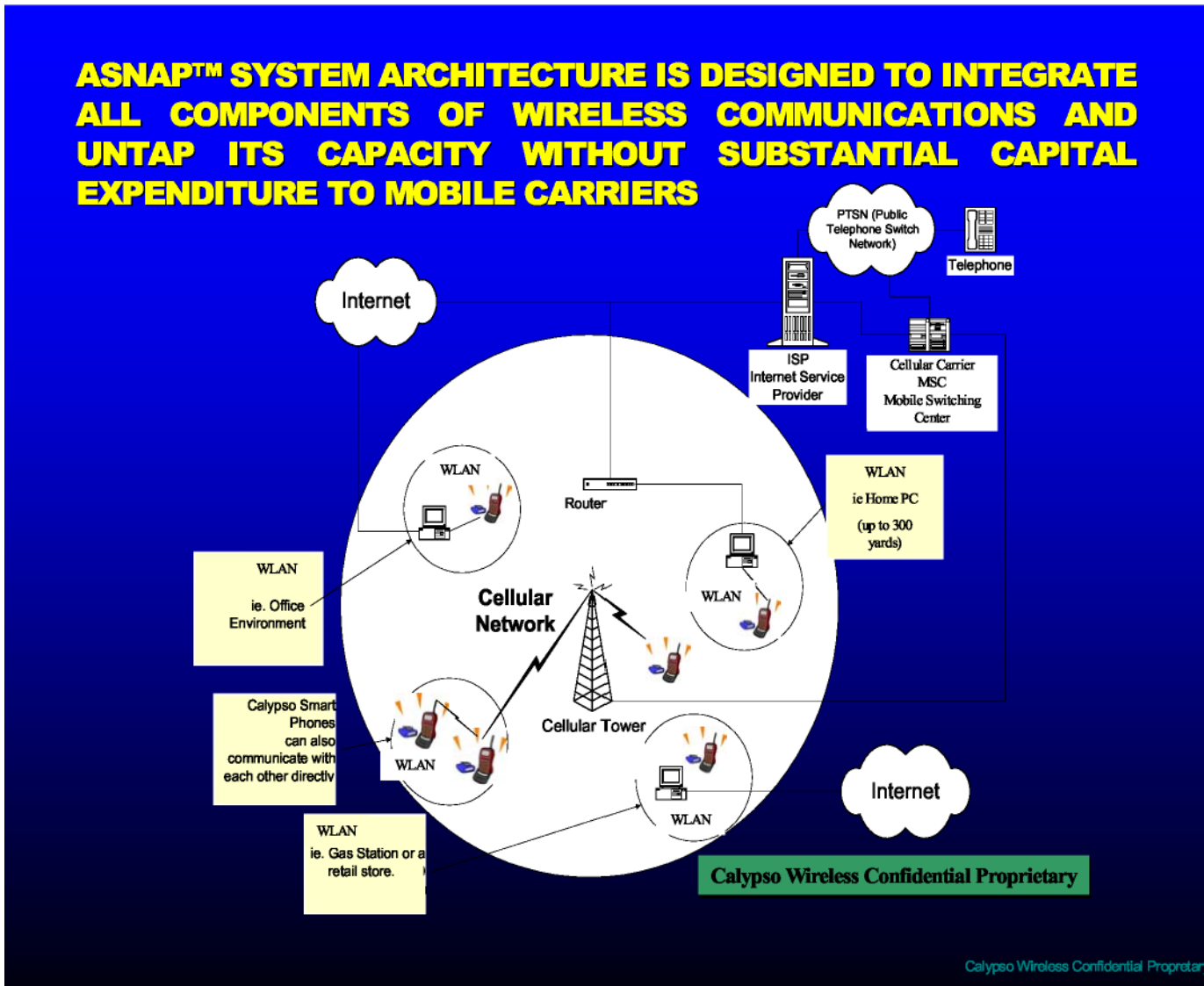


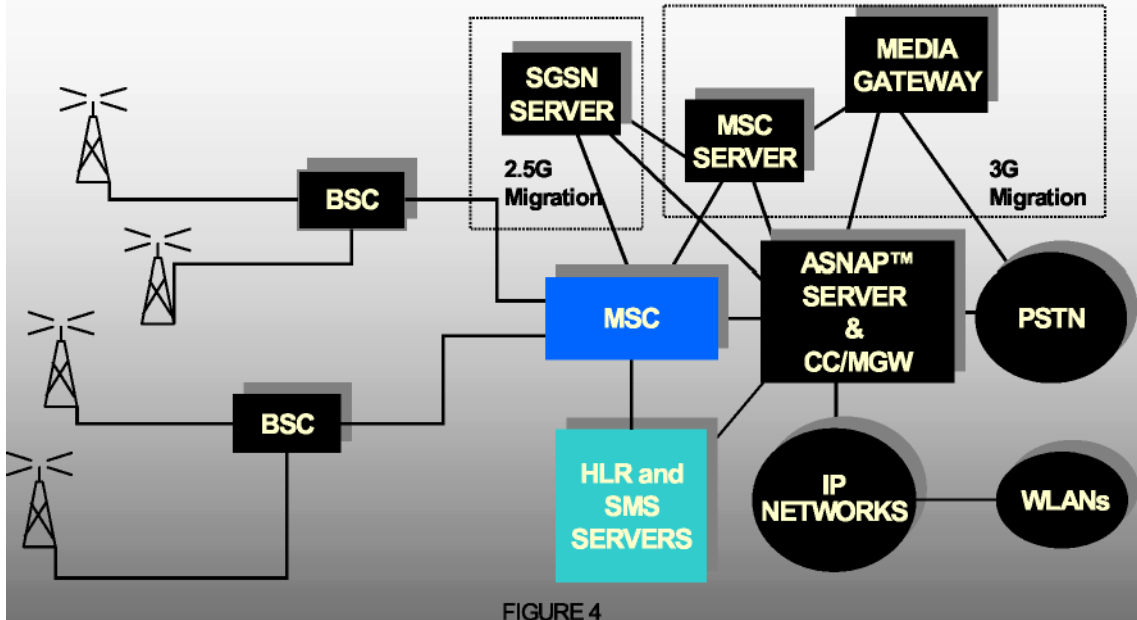
Figure 3.

The Architecture depicts Wi-Fi zones, which are also, WLAN circles consisting of office, retail store, gas stations, home and Calypso smart phone peer-to-peer environments within a larger cellular network circle. The relationship between the WLAN circles to the ISP, cellular carrier's MSC and the PSTN (where the data signal terminates on a wire line) are also highlighted.

The detailed WLAN and ISP relationships with each access point are highlighted further in figures 5 and 6.

Figure 2 highlights a generic situation where a call is switched from the current system to the WLAN, and steps taken in migrating the network to 3G.

CALYPSO'S ASNAP™ ARCHITECTURE IS GENERICALLY REPRESENTED AS FOLLOWS:

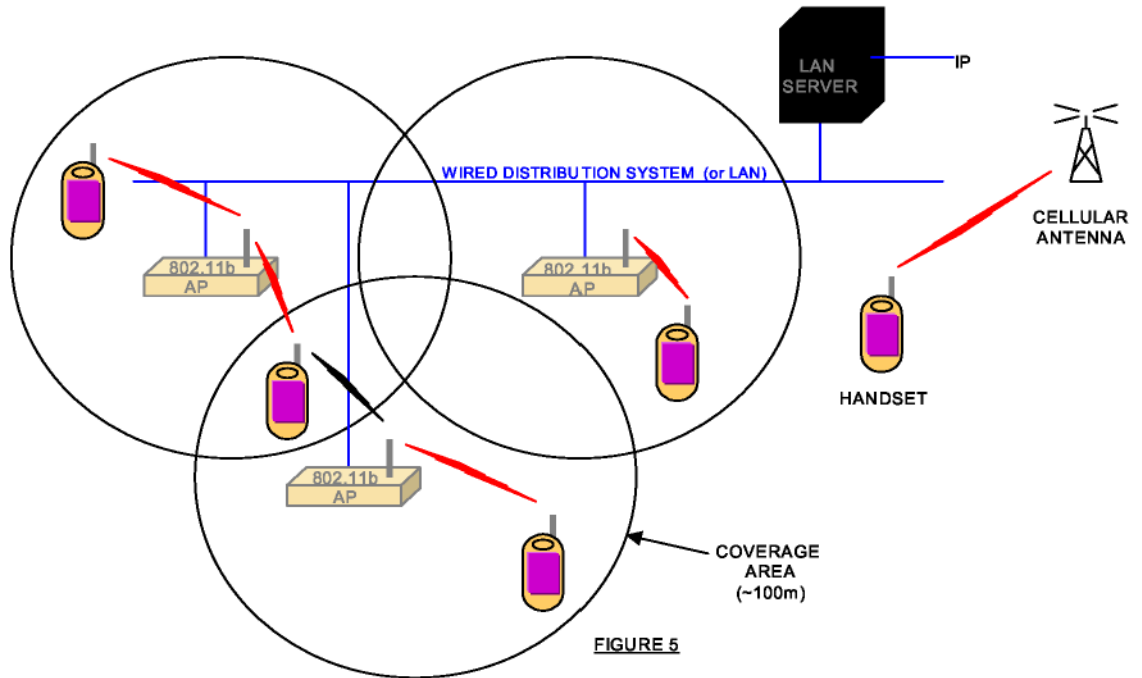


architecture where it will take control of the call and switching only when a WLAN connection is established. Otherwise, all call control functionality is handled by the current system.

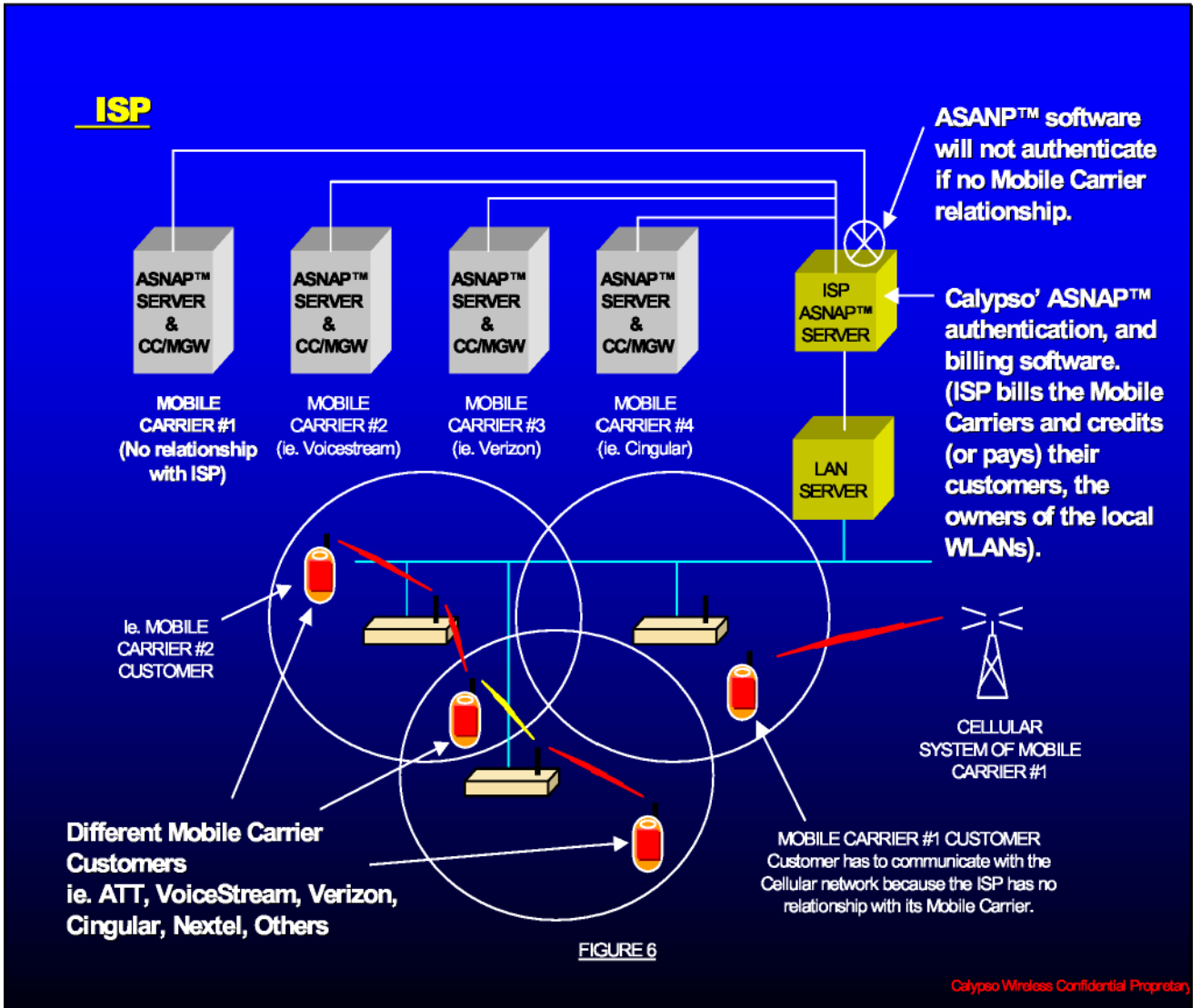
In the migration to 3G systems, the ASNAP™ Server and CC/MGW functionality can be implemented internally as part of the new 3G MSC's. Or, consistent with the layered architectures proposed for 3G systems, it can be implemented externally as shown above.

WLAN

ISP CUSTOMER MUST HAVE WIRELESS ACCESS POINT(S) AND ASNAP™ SOFTWARE TO GIVE WLAN OWNER POWER TO CONTROL ACCESS AND BANDWIDTH ALLOCATION.



Calypso Wireless Confidential Proprietary



CALYPSO'S ASNAP™ APPLICATIONS

A wide range of corporate and consumer applications could be enabled through Calypso Wireless ASNAP™ technologies. Today's cellular data rates are typically 14kbps to 30 kbps. The Calypso ASNAP™ technology is able to support 1 Mbps to 11 Mbps (or greater) data rates within the WLAN. With increased wireless data rates, the services will expand from voice-based systems to include:

Two-way interactive real-time video conferencing with real time audio

Fast pictures with data messages

Video clips with data messages Video clips with audio two way data messaging

These services will be used to support applications such as simple e-mail or video content including news, financial and sports highlights, entertainment clips, traffic and weather reports. Domestic uses include games, day care, and high level security including immigration, crime fighting, military, banking, video paging, etc.

Calypso's real-time two-way video cellular phones can be used for chatting, or for other common voice-type communications, or a Realtor who could perform a walk-through of a house to help a prospective out-of-town buyer assess the condition of the property. Or a technical support process could be improved because a problem could be viewed live, thus reducing down time of a manufacturing facility. In law enforcement, homeland security, or immigration, officers could send real-time picture of a potential terrorist suspect to cross reference real-time video in database, thus helping with high security decision issues for homeland security.

By and large, these high-value applications using Calypso's ASNAP™ technology are examples of how network providers could increase their revenues and survive in an increasingly competitive mostly voice-only market.

COMPETITION FROM VoIP PDAs

Certain concerns have been raised if PDA's with VoIP will directly or indirectly compete with the Calypso smart mobile handsets within the Wi-Fi zones, since both give the user voice benefit. The constraint with such PDA devices rests with whether voice connection will be established against the reality of the constraints posed by whether the mobile carrier has VoIP platform in their grid. And if the carrier does, voice signal is lost as soon as the PDA user leaves the Wi-Fi zone.

However, Calypso's Media Gateway Controllers can move traffic independently of the Mobile Carrier's MSC, when a call must pass between the backbone packet network and the PSTN (e.g. a PDA for VoIP customer calls a traditional analog customer). The media Gateway Controllers uses the signaling Gateway to enhance SS7 messages with PSTN class 4 and class 5 switches.

The net effect is that this reduces MSC data channel loading thus saving the mobile carrier expensive cellular spectrum. A PDA VoIP customer can therefore be charged less per minute per call, compared to a true cellular phone user that is switched through the mobile carrier's MSC. Calypso ASNAP™ can therefore be described as complementary to PDA with VoIP devices, rather than competing with it. The mobile carrier is already monetizing its Access Points within the Wi-Fi's WLAN, and the PSTN.

For more information on our products and services, please contact us at:

Calypso Wireless, Inc.
5753 NW 158th Street,
Miami Lakes, FL 33014
USA.

Tel: 1-(305)-828-1483 Fax:
1-(305)-828-6230
info@calypsowireless.com

Web site: www.calypsowireless.com