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BROKERAGE MARKETING PACKAGE

"LTE –Advanced Technology Patent Portfolio"

THIS OFFERING IS FOR THE SALE OF:

A PORTFOLIO OF 20 US PATENTS, 8 US PATENT APPLICATIONS, 2 EP PATENTS, and 5 EP APPLICATIONS

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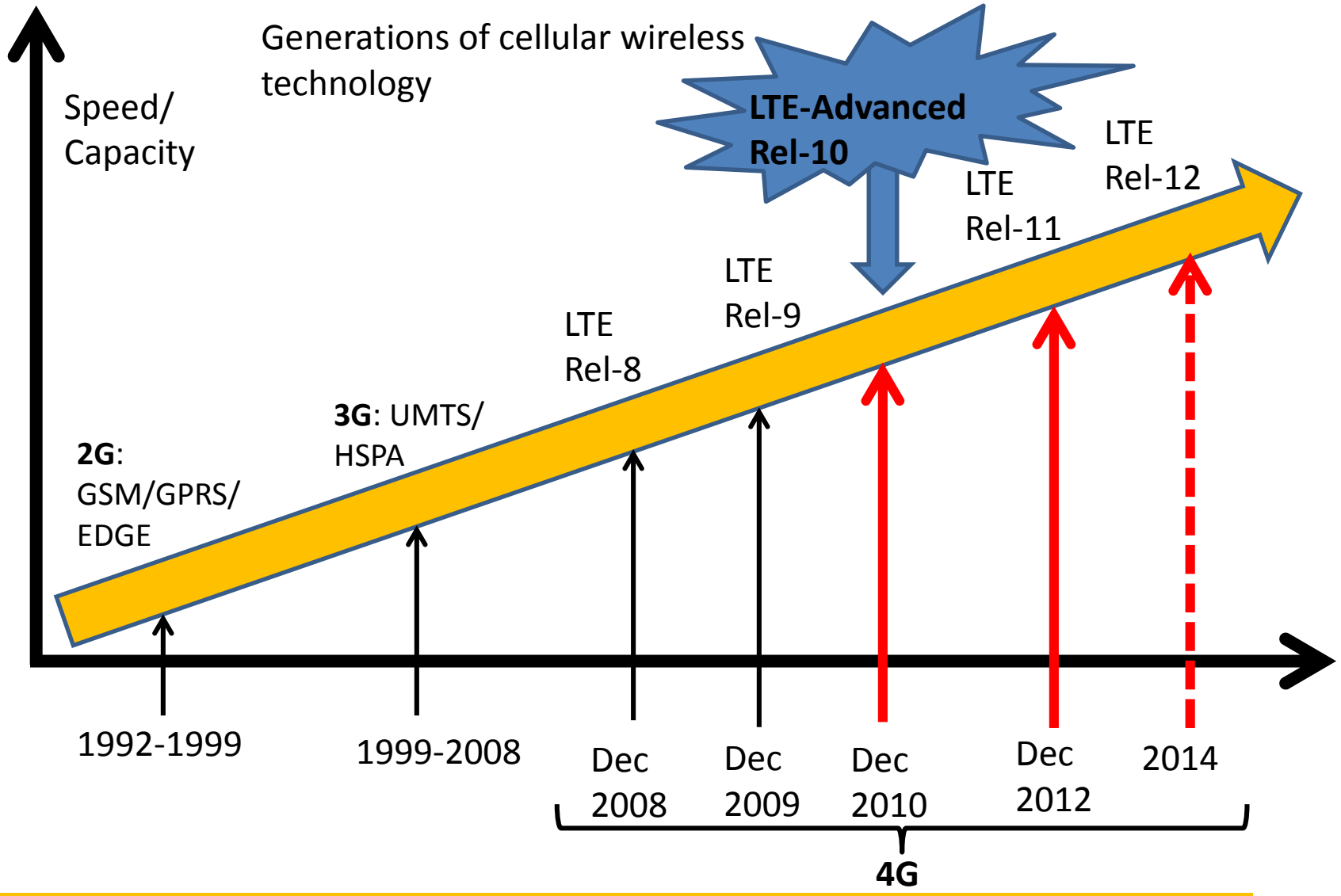
OUTLINE

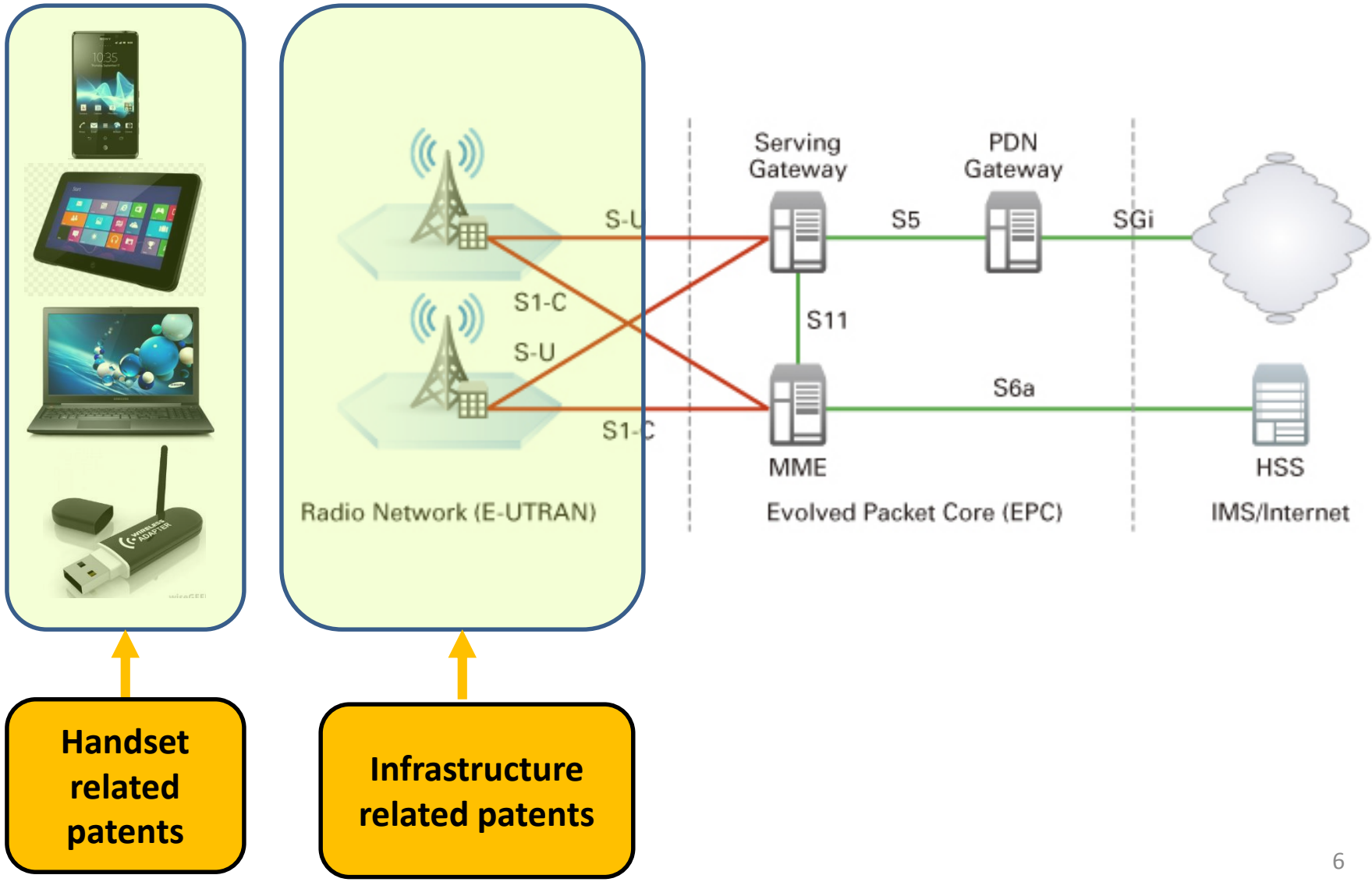
Overview

Cellular Wireless Technology Evolution



Release 11 and beyond products are expected to be introduced to the market in 2015-2016 time period.

LTE Network Architecture



LTE-Advanced Technology

- LTE is the worldwide *c*ellular network technology standard for 4G
- LTE-Advanced offers 1Gbps downlink speed and is often called “True 4G” and meets ITU-T requirements for 4G networks
- LTE operators plan to upgrade their LTE network to LTE-Advanced
  - Japan, South Korea and Russia deployed LTE-A in 2013, Samsung Galaxy 4S includes LTE-A
  - Many operators in US/Europe plan trials in 2014

LTE-Advanced Advantages

- Carrier Aggregation
  - Results in ~5 times more speed compared with LTE
  - Enables aggregation of carriers in different bands
- Advanced MIMO
  - Results in ~2 times more speed compared with LTE
- Heterogeneous Network
  - Provides flexible network deployment
- Enhanced Control Channel and Signaling
  - Provides enhanced interference control and spectral efficiency

Details of the Patent Portfolio

LTE-Advanced Patent Portfolio

Patent Applications	No. of Patents
PCT Applications	3
EP National Stage Applications	2
EP Issued/Allowed Patents	2
US Issued/Allowed Patents	20
Pending US applications	8
Total	**35**

Portfolio includes 11 patent families.

LTE-Advanced Patent Portfolio

Technology Category	No. of Patents
Release-11 Standard Essential	18
Release-11 Implementation	2
Release-13 Standard Essential*	11
Release-11/13 Standard Essential*	4
Total	**35**

* Expected to be standard essential; standard is under development.

IPofferings

A. Release 11 Standard Essential

Patent assets related to Release 11 Standard Essential include 13 US patents, 3 US patent applications and 1 EP patent asset (listed below).

IP Assets

Patent No.	Publication Number	Title	LTE-Release	Technology Category: 1) ePDCCH, 2) Inter-band Carrier Aggregation, 3) NCT (New Carrier Type)	Application Priority Date	Application Filing Date
8,483,172	US 2013-0176974 A1	Enhanced Signaling in a Wireless Device and Base Station	Rel-11	ePDCCH	7/1/2011	3/5/2013
8,526,459	US 2013-0195057 A1	Wireless Device Capability and Enhanced Control Channel	Rel-11	ePDCCH	12/4/2011	3/8/2013
8,576,794	US 2013-0308576 A1	Channel Configuration in a Wireless Network	Rel-11	ePDCCH	7/1/2011	7/22/2013
8,531,990	US 2013-0215871 A1	Handover Signaling in Wireless Networks	Rel-11	ePDCCH	12/4/2011	3/28/2013
8,526,393	US8526393 B1	Radio Resource Configuration	Rel-11	ePDCCH	7/1/2011	5/22/2013
8,571,056	US 2013-0294385 A1	Enhanced Control Channel for a Wireless Device	Rel-11	ePDCCH	12/4/2011	7/10/2013
8,804,772	US 2014-0003385 A1	Radio Resources for Data and Scheduling Information	Rel-11	ePDCCH	7/4/2011	9/3/2013
8,711,731	13956640	Handover Signaling in Wireless Networks	Rel-11	ePDCCH	12/4/2011	8/1/2013
8,699,449	US 2013-0322382 A1	Radio Resource Configuration	Rel-11	ePDCCH	7/1/2011	8/6/2013

contd...

A. Release 11 Standard Essential

Patent assets related to Release 11 Standard Essential include 13 US patents, 3 US patent applications (1 notice of allowance) and 2 EP patent asset (listed below).

IP Assets

Patent No.	Publication Number	Title	LTE-Release	Technology Category: 1) ePDCCH, 2) Inter-band Carrier Aggregation, 3)	Application Priority Date	Application Filing Date
	US 2014-0029577 A1	Handover Signaling in a Wireless Network	Rel-11	ePDCCH	12/4/2011	10/1/2013
8,422,455	US 2013-0114542 A1	Enhanced Control Channel in Multicarrier Wireless Networks	Rel-11	ePDCCH	7/1/2011	12/26/2012
	US 2014-0064240 A1	Channel Configuration in a Wireless Network	Rel-11	ePDCCH	7/1/2011	11/4/2013
8,811,333	US 2014-0177577 A1	Control And Data Channel Radio Resource Configuration	Rel-11	ePDCCH	7/1/2011	3/1/2014
8,953,550	US 2014-0177578 A1	Channel Configuration in a Wireless Network	Rel-11	ePDCCH	7/1/2011	3/1/2014
8,908,633	US 2014-0328315 A1	Control And Data Channel Radio Resource Configuration	Rel-11	ePDCCH	7/1/2011	7/22/2014
	14558095	Control And Data Channel Radio Resource Configuration	Rel-11	ePDCCH	7/1/2011	12/2/2014
	EP 14200113.0	Broadcast Channel in Multicarrier Systems	Rel-11	ePDCCH	7/1/2011	12/23/2014
EP2564612 A1	EP2564612 A1	Broadcast Channel in Multicarrier Systems	Rel-11	ePDCCH	7/4/2011	7/3/2012

EOU's Available in attached pdf. All other are available upon request

contd...

IP Offerings

IP Assets

B. Release 11 Implementation

Patent assets related to Release 11 Implementation include 2 US patent applications. (listed below).

Patent No.	Publication Number	Title	LTE-Release	Technology Category: 1) ePDCCH, 2) Inter-band Carrier	Application Priority Date	Application Filing Date
	US 2013-0294369 A1	Control Channel in a Wireless Communication System	Rel-11	ePDCCH	5/4/2012	5/6/2013
	US 2014-0105165 A1	Radio Resources Configuration Signaling in a Wireless Network	Rel-11	ePDCCH	7/1/2011	12/23/2013

C. Release 11 & 13 Standard Essential

Patent assets related to Release 11 & 13 Standard Essential include 4WIPO patent applications. (listed below).

Patent No.	Publication Number	Title	LTE-Release	Technology Category: 1) ePDCCH, 2) Inter-band Carrier	Application Priority Date	Application Filing Date
	WO/2013/006379 A1	Synchronization Signal and Control Messages in Multicarrier OFDM	Rel-11, Rel-13	ePDCCH + NCT	7/1/2011	6/28/2012
	WO/2013/006593 A1	Broadcast Channel in Multicarrier Systems	Rel-11, Rel-13	ePDCCH + NCT	7/4/2011	7/3/2012
	WO/2013/085823 A1	Handover in Multicarrier Wireless Networks	Rel-11, Rel-13	ePDCCH + NCT	12/4/2011	12/1/2012
	EP 2012805848.4	Handover in Multicarrier Wireless Networks	Rel-11, Rel-13	ePDCCH + NCT	12/4/2011	

IPofferings

D. Release 13 Standard Essential

Patent assets related to Release 13 Standard Essential include 6 US patents, 4 US patent applications and 2 EP patent asset (listed below).

IP Assets

Patent No.	Publication Number	Title	LTE-Release	Technology Category: 1) ePDCCH, 2) Inter-band Carrier	Application Priority Date	Application Filing Date
8,582,527	US 2013-0003673 A1	Hybrid Automatic Repeat Request in Multicarrier Systems	Rel-13	NCT (New Carrier Type)	7/1/2011	6/29/2012
8,427,976	US 2013-0308576 A1	Carrier Information Exchange between Base Stations	Rel-13	NCT (New Carrier Type)	12/4/2011	11/30/2012
8,446,844	US 2013-0142064 A1	Handover in Multicarrier Wireless Networks	Rel-13	NCT (New Carrier Type)	12/4/2011	11/30/2012
8,369,280	US 2013-0003672 A1	Control Channels in Multicarrier OFDM Transmission	Rel-13	NCT (New Carrier Type)	7/1/2011	6/28/2012
8,437,303	US 2013-0010715 A1	System Frame Number in Multicarrier Systems	Rel-13	NCT (New Carrier Type)	7/4/2011	7/2/2012
	US 2013-0223381 A1	Frame Number in Multicarrier Wireless Networks	Rel-13	ePDCCH + NCT	7/4/2011	4/5/2013

EOU's Available in attached pdf. All other are available upon request

contd...

E. Release 13 Standard Essential

Patent assets related to Release 13 Standard Essential include 6 US patents, 4 US patent applications and 2 EP patent asset (listed below).

IP Assets

Patent No.	Publication Number	Title	LTE-Release	Technology Category: 1) ePDCCH, 2) Inter-band Carrier	Application Priority Date	Application Filing Date
8,842,637	US 2013-0142141 A1	Carrier Information Transmission to Wireless Devices	Rel-13	ePDCCH + NCT	12/4/2011	11/30/2012
	US 2013-0250882 A1	Information Exchange between Base Stations	Rel-13	ePDCCH + NCT	3/25/2012	3/25/2013
	1448573	Carrier Information Transmission to Wireless Devices	Rel-13	ePDCCH + NCT	12/4/2011	9/14/2014
EP2564611 A1	EP2564611 A1	Synchronization Signal and Control Messages in Multicarrier OFDM	Rel-13	ePDCCH + NCT	7/1/2011	6/28/2012
EP2564612 A1	EP2564612 A1	Broadcast Channel in Multicarrier Systems	Rel-13	ePDCCH + NCT	7/4/2011	7/3/2012
	US 2014-0177598 A1	Handover Signaling in Wireless Networks	Rel-13	ePDCCH + NCT	12/4/2011	3/2/2014

contd…

EOU's Available in attached pdf. All other are available upon request

E. Release 13 Standard Essential

Patent assets related to Release 13 Standard Essential include 6 US patents, 4 US patent applications and 2 EP patent asset (listed below).

IP Assets

Patent No.	Publication Number	Title	LTE-Release	Technology Category: 1) ePDCCH, 2) Inter-band Carrier Aggregation, 3)	Application Priority Date	Application Filing Date
8,842,637	US 2013-0142141 A1	Carrier Information Transmission to Wireless Devices	Rel-13	ePDCCH + NCT	12/4/2011	11/30/2012
	US 2013-0250882 A1	Information Exchange between Base Stations	Rel-13	ePDCCH + NCT	3/25/2012	3/25/2013
	US 20150003381 A	Carrier Information Transmission to Wireless Devices	Rel-13	ePDCCH + NCT	12/4/2011	9/14/2014
EP2564611 A1	EP2564611 A1	Synchronization Signal and Control Messages in Multicarrier OFDM	Rel-13	ePDCCH + NCT	7/1/2011	6/28/2012
	US 2014-0177598 A1	Handover Signaling in Wireless Networks	Rel-13	ePDCCH + NCT	12/4/2011	3/2/2014

EOU's Available in attached pdf. All other are available upon request

contd...

LTE-Advanced Patent Portfolio

Claim Applicability – Target Product	No. of Patents
Handsets and Infrastructure	25
Infrastructure only	10
Total	**35**

LTE-Advanced Patent Portfolio

	No. of Patents
ePDCCH configuration/signaling	19
New Carrier Type	12
ePDCCH / New Carrier Type	4
Total	**35**

Detailed List of Patents (in Excel File)

Detailed list of the patents are in Excel worksheet LTE-A Portfolio-1.

- Patent #/Application #/Publication #
- Priority date/Filing date
- Title/Abstract/Claims
- Independent/dependent claims
- Handset and infrastructure claims
- Broadest claims
- Applicable LTE Releases/LTE standards
- Standard essential/implementation
- Brief description

Continuation Patent Applications

- Every patent application has a pending continuation application
- Specifications are very detailed and cover:
  - New features of Release 13 standard
  - New features implemented in LTE-A products
- Each PCT application includes a comprehensive disclosure and multiple inventions

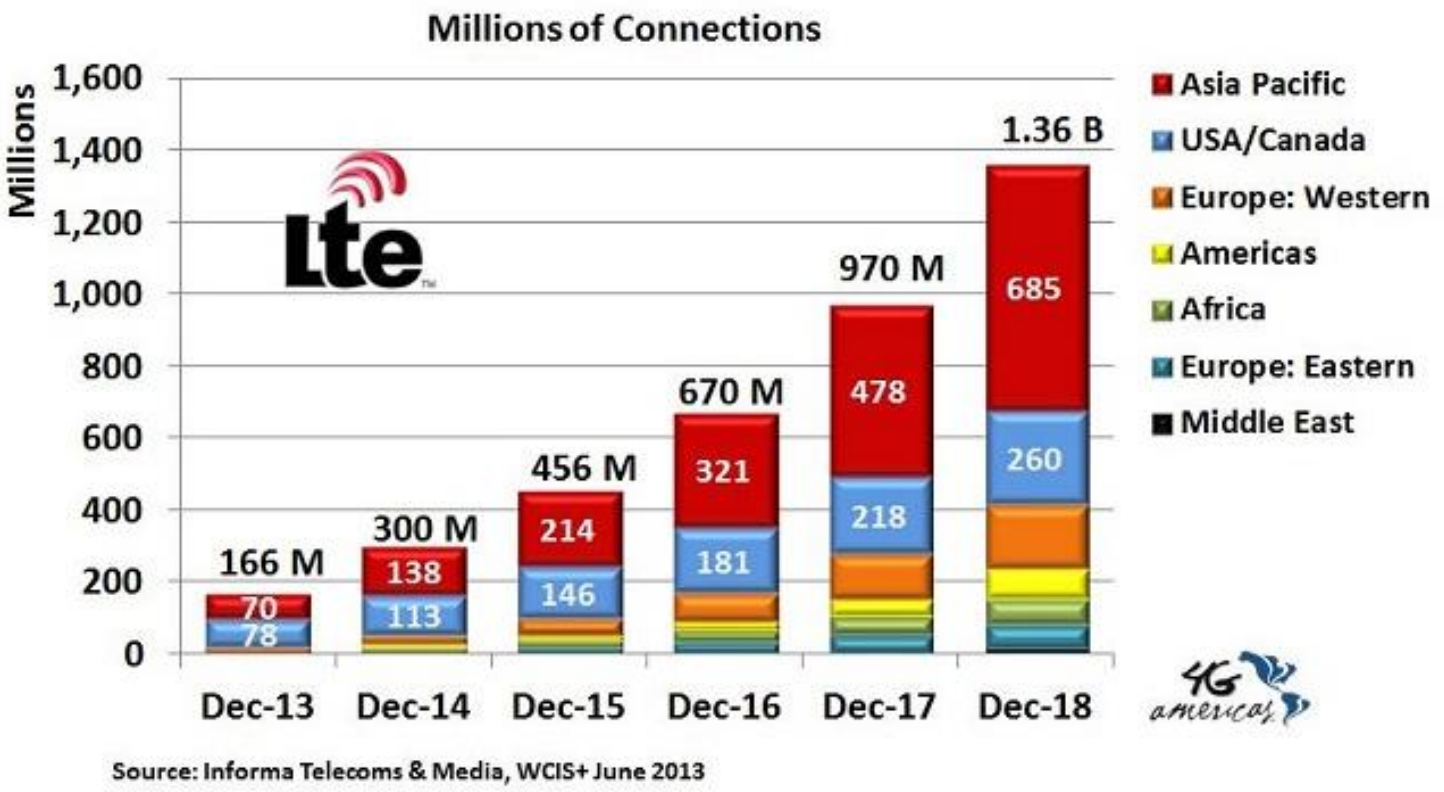
LTE-Advanced Patent Portfolio

- This patent portfolio is not subject to FRAND obligations
  - Detailed claims analysis against standards and exemplary products and services are available for ALL the patents
- All the patents are assigned to Ofinno Technologies, LLC
- Terminal disclaimers are filed for continuation applications
- No patent licensing or litigation is underway

LTE-Advanced Marketplace

Global LTE Subscriber Growth

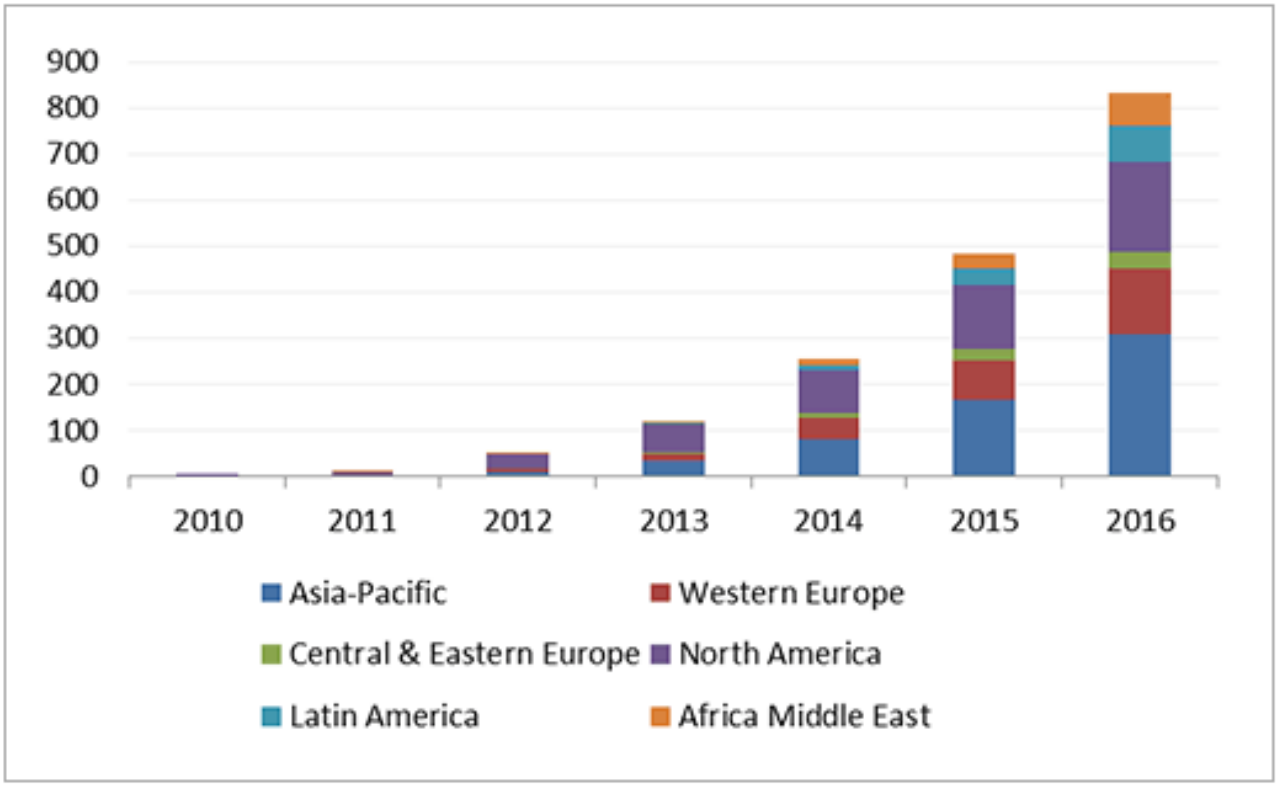
By the end of 2016, 4G Americas forecasts that there will be more than 670 million LTE subscriptions worldwide , including more than 300 Millions in North America and EU.



http://www.4gamericas.org/index.cfm?fuseaction=page&pageid=1781

Global LTE Subscriber Growth

By the end of 2016, IDATE forecasts that there will be more than 830 million LTE subscriptions worldwide, including more than 350 Millions in North America and EU.

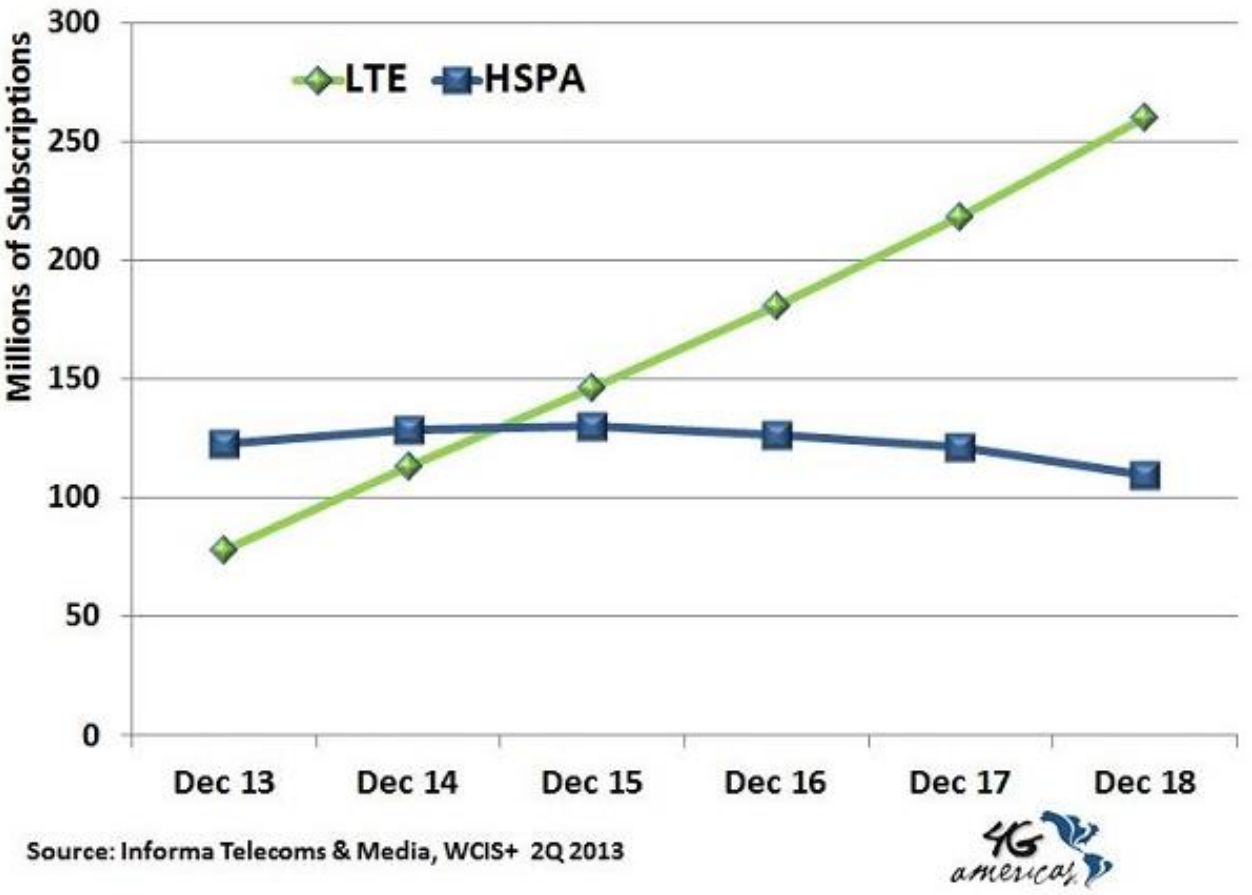


Source: IDATE, LTE Watch Service, March 2012

http://www.afjv.com/news/1069_lte-market.htm

US/Canada LTE Subscriber Growth

By the end of 2016, 4G Americas forecasts that there will be more than 200 million LTE subscriptions in US and Canada.



http://www.4gamericas.org/index.cfm?fuseaction=page&pageid=2123

LTE Handset/Infrastructure Market

- TechCrunch: LTE Phone Shipments Will Triple To 275M Units In 2013 (Dec 2012)
  - http://techcrunch.com/2012/12/19/lte-phone-shipments-will-triple-to-275m-units-in-2013-with-amazon-mozilla-among-those-waiting-in-the-wings-to-pounce/
- ABI: 840 Million LTE handsets shipments in 2018 (Jan 2013)
  - http://www.telecompetitor.com/abi-more-than-half-of-2014-handset-shipments-will-be-smartphones/
- RCRWireles: The worldwide LTE equipment market is set to double this year, surpassing $10 billion (March 2013)
  - http://www.rcrwireless.com/article/20130313/infrastructure-2/report-lte-infrastructure-market-set-double-2013/#_
- Infonetics: LTE equipment to hit $17.5 billion in 2016 (May 2012)
  - http://www.infonetics.com/pr/2012/1Q12-2G-3G-4G-LTE-WiMAX-Infrastructure-Market-Highlights.asp
- Frost & Sullivan: the global LTE test equipment market generated revenues of $760.8 million in 2011 and is estimated to reach $2.84 billion in 2018
  - http://www.telecomlead.com/test-and-measurement/lte-test-equipment-market-to-reach-2-84-billion-in-2018-2018/

Summary: LTE Market in 2016

- 700 million worldwide subscribers including
  - ~300 million in North America and EU
- 420 million worldwide LTE handsets shipments
  - Wholesale market size: ~$250x420M = $105 billion
  - Including ~$50B in North America and EU
- Worldwide infrastructure market:$17.5 billion
  - Including ~$8 billion in North America and EU
- Worldwide test equipment market: ~$1.5 billion

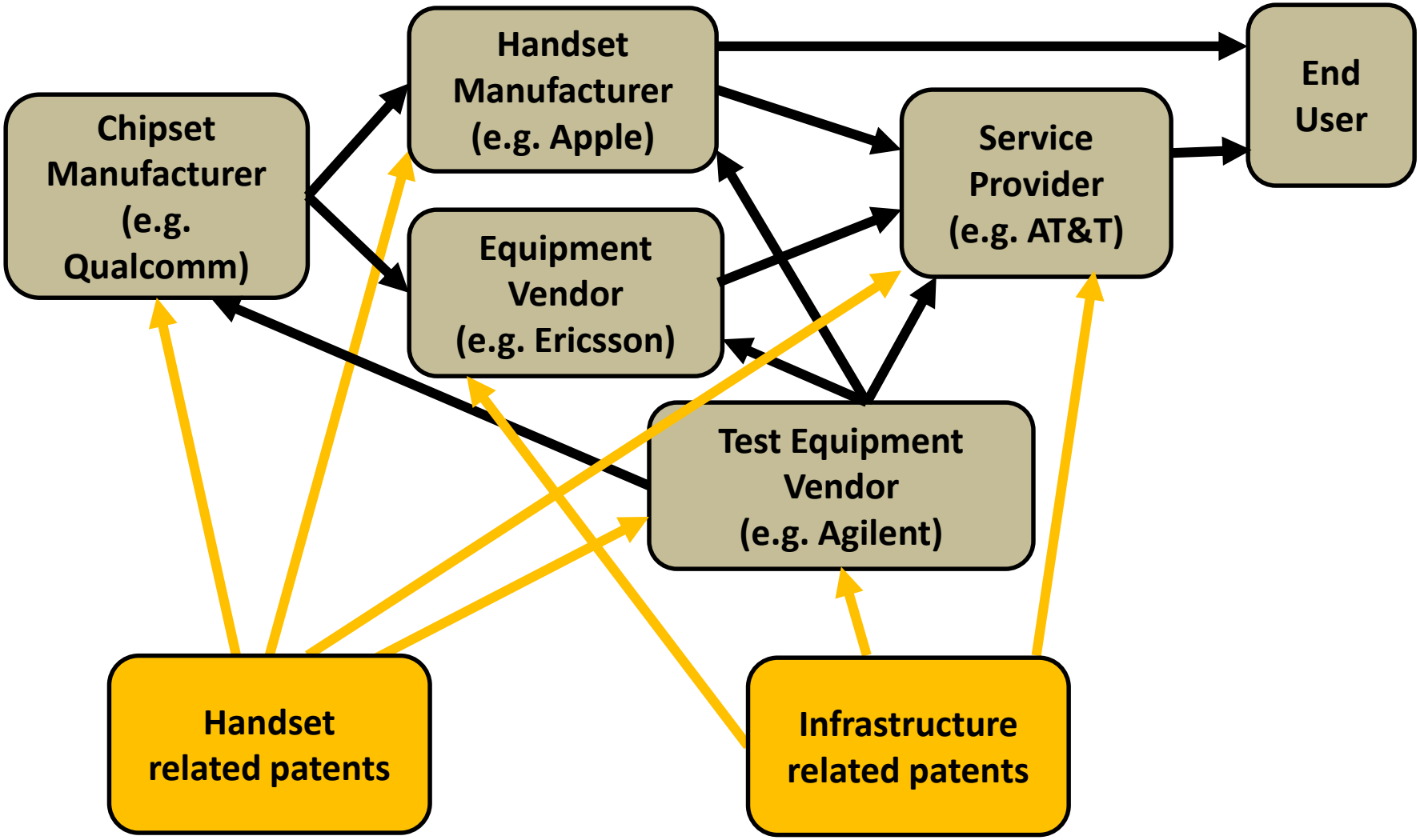
Potential Buyers & Licensees

IPofferings

POTENTIAL BUYERS AND LICENSEES

- LTE Chipset Manufacturers
- LTE Handset Manufacturers
- LTE Infrastructure Vendors
- LTE Service Operators
- LTE Test Equipment Vendors

LTE Value Chain & LTE-A Portfolio



Potential Licensees: LTE Chipset Manufacturers

- Qualcomm
- Altair Semiconductor
- Broadcom
- Cavium Networks
- Intel
- MediaTek
- Fujitsu
- Panasonic

- Renesas Mobile
- Samsung
- Sequans
- ST-Ericsson
- Freescale Semiconductor
- picoChip
- Texas Instrument

Potential Licensees: LTE Handset Manufacturers

- Apple
- Samsung
- HTC
- Microsoft/Nokia
- Google/Motorola
- LG
- PanTech
- Amazon
- Sharp
- Blackberry
- Huawei
- ZTE

- Sony
- Panasonic
- Barnes & Noble
- Toshiba
- Kyocera
- Garmin
- Lenovo
- Acer
- Asus
- Altek
- Zen Mobile

Potential Licensees: LTE Infrastructure Vendors

- Ericsson
- Huawei Technologies
- ZTE
- Alcatel-Lucent
- Nokia Siemens Networks
- Motorola
- Samsung Electronics
- Tekelec
- Fujitsu Network Communications
- Hitachi Communication Technologies
- NEC
- Panasonic Mobile Communications
- General Dynamics

Potential Licensees: LTE Test Equipment Vendors

- Agilent Technologies
- Anritsu
- Rohde & Schwarz
- Aeroflex
- Spirent Communications
- JDSU
- Ixia
- Anite
- Aricent
- Tektronix Communications
- Qasara
- Aeroflex

IPofferings

Potential Licensees: LTE Service Operators

- Example US LTE Service Operators:
  - **Verizon Wireless, AT&T, T-Mobile, Sprint, Leap Wireless, U.S. Cellular**
- Example Canadian LTE Service Operators:
  - **Bell, Eastlink, MTS, Rogers Wireless, Telus, SaskTel**
- Example EU LTE Service Operators:
  - **Vodafone, Deutsche Telecom, Orange, Telia, Swisscom, Telefonica, T-mobile, Mobistar, Vivacom, Elisa, Sonera, Bouygues, SFR**

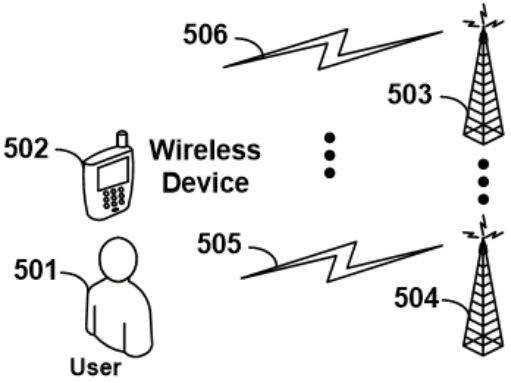
LTE-Advanced Portfolio Implementation & Claim Analysis

- **ePDCCH Configuration and Signaling**
- **New Carrier Type**

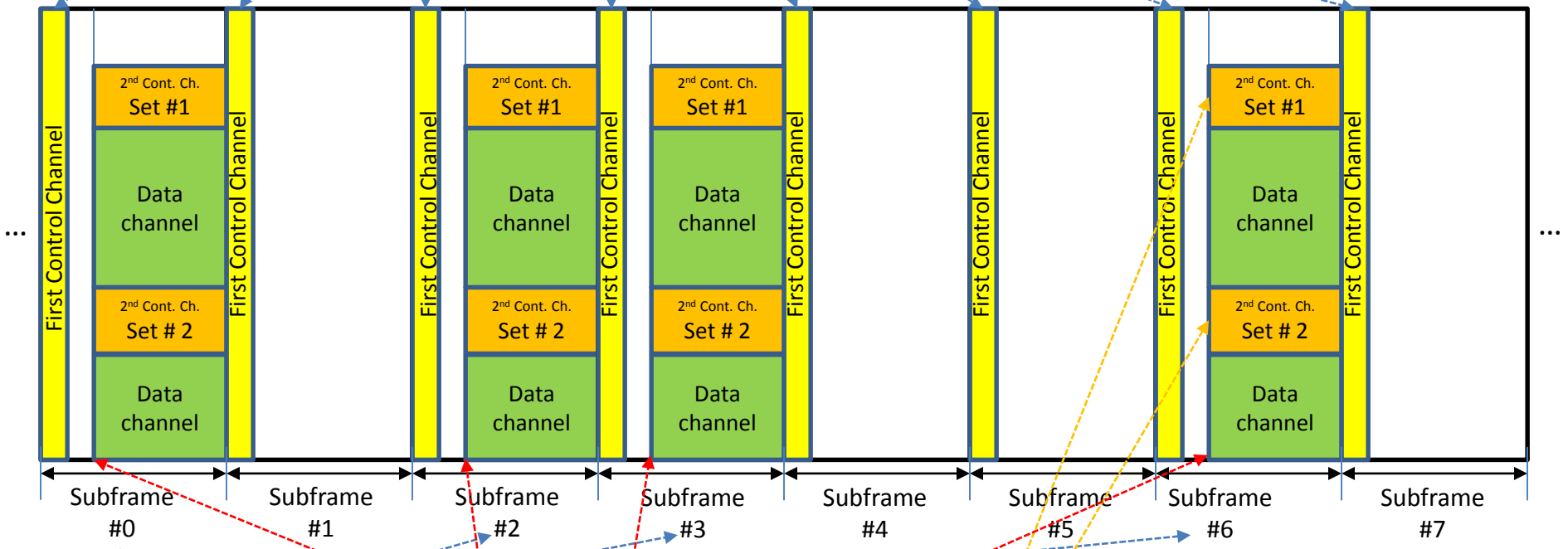
ePDCCH Configuration and Signaling

- Improves spectral efficiency and capacity of downlink control channel
- Enhances scalability and flexibility of downlink control channel
- Enables ICIC in co-channel HetNet networks
- Included in service operator LTE-A deployment roadmap and handset/ infrastructure vendors implementation plan

ePDCCH Configuration



Legacy PDCCH



ePDCHC resources are in a subset of subframes

Starting OFDM Symbol of ePDCCH and PDSCH is configured in the subset of subframes

one or more sets of resource blocks in a subset of subframes

Examples of Inventions in the Area of ePDCCH Configuration and Signaling - 1/2

- ePDCCH radio resource configuration parameters in RRC signaling
  - US8,483,172, US8,526,393, PCT/US12/44665, PCT/US12/45342,EP2564611 A1, EP2564612 A1, 14194704
- RRC signaling transmission mechanism for ePDCCH
  - US8,483,172, US8,526,393, 14/016921 , PCT/US12/44665, PCT/US12/45342, EP2564611 A1, EP2564612 A1
- Subframe/symbol configuration for ePDCCH
  - US8,483,172, US8,526,393, PCT/US12/44665, PCT/US12/45342, EP2564611 A1, EP2564612 A1
- Configuration of HARQ feedback for ePDCCH
  - US8,576,794, 14/070,623 , PCT/US12/44665, PCT/US12/45342, EP2564611 A1, EP2564612 A1, 14/194708
- Coexistence of legacy and enhanced PDCCH

13/960,716, US8,422,455 , PCT/US12/44665, PCT/US12/45342, EP2564611 A1, EP2564612 A1

IPofferings

Examples of Inventions in the Area of ePDCCH Configuration and Signaling 2/2

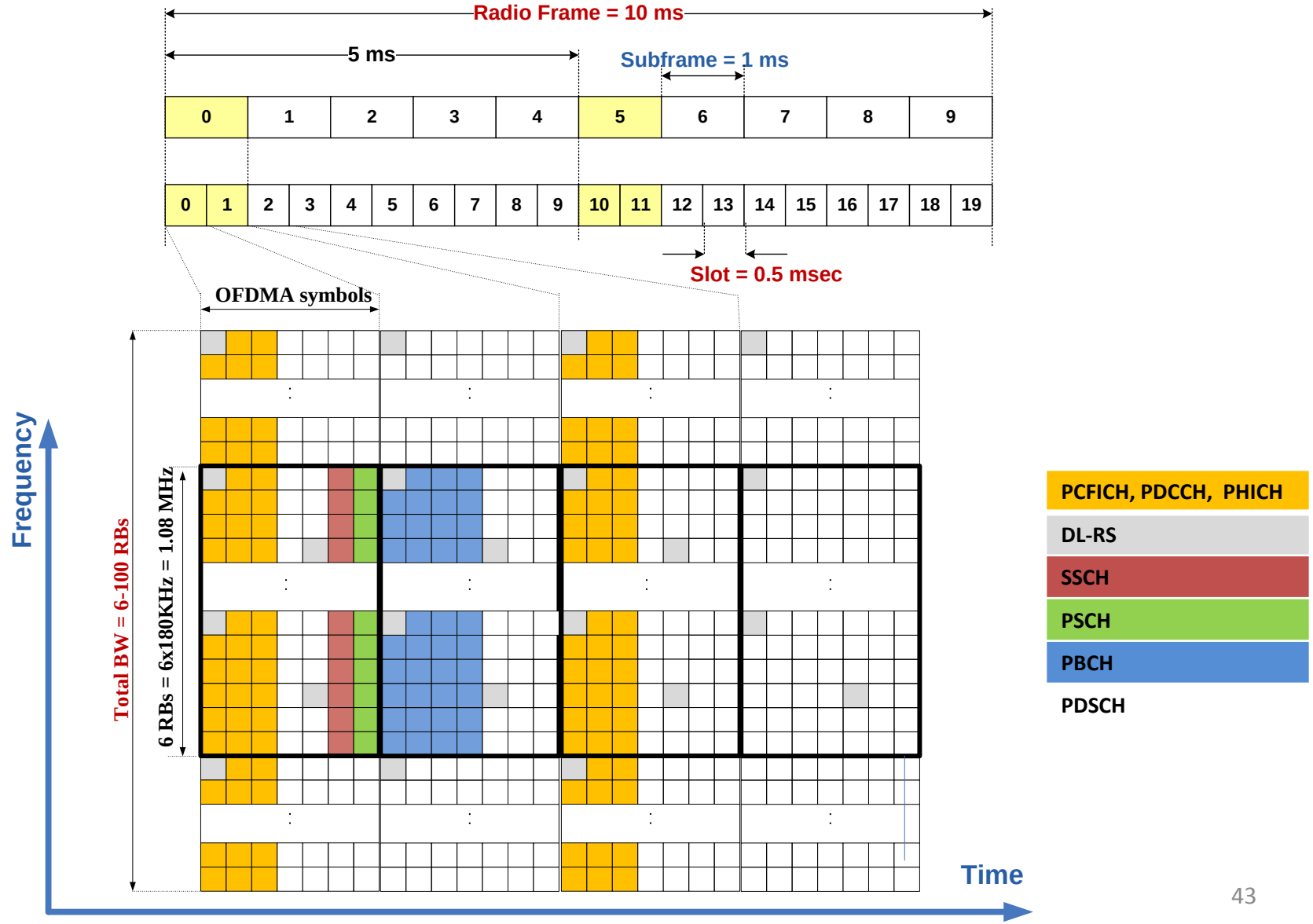
- Resource block assignment for ePDCCH radio resources
  - PCT/US12/44665, PCT/US12/45342, EP2564611 A1, EP2564612 A1, 14/194704
- ePDCCH capability message and configuration
  - US8,526,459, US8,531,990, US8,571,056, 13/956,640, PCT/US12/67499
- Handover signaling and ePDCCH configuration
  - US8,531,990, 13/956,640, 14/042,840, PCT/US12/67499
- Backhaul X2 signaling implementation for ePDCCH ICIC coordination
  - 13/887,408
- Configuration of legacy PDCCH resources to reduce inter-cell interference
  - 13/850,228

IPofferings

New Carrier Type in R-13 and Beyond

- Enhances spectral efficiency of legacy LTE carriers by reducing signaling overhead
- Enhances flexibility in network deployment
- Increases peak data rate
- Discussed in Release-12 of LTE-Advanced Standard, but pushed back to Release-13

Radio Resource Organization and NTC



Examples of Inventions in the Area of New Carrier Type

- Broadcast signaling configuration
  - PCT/US12/45342, EP2564612 A1, US8,369,280
- Carrier synchronization in new carrier type
  - EP2564611 A, PCT/US12/44665
- HARQ feedback channels in new carrier type
  - US8,582,527
- Data/control radio resources in new carrier type
  - PCT/US12/45342, EP2564612 A1
- Configuration parameters for new carrier type
  - PCT/US12/67499, 13/691,714, US8,369,280, US8,427,976, US8,427,976
- Handover signaling and new carrier type configuration
  - PCT/US12/67499, US8,446,844, 13/691,714, 14/194754

Claim Analysis

- Detailed claim charts are available for ALL the 35 patents/applications
  - Claims are mapped to LTE standards
  - Implementation aspects are described for exemplary products and services
- Patents are mainly applicable to 3GPP 36 series of standards, including:
  - 3GPP TS 36.213: E-UTRA Physical layer procedures
  - 3GPP TS 36.300: E-UTRA and E-UTRAN Overall description; Stage 2
  - 3GPP TS 36.331: E-UTRA RRC Protocol specification
  - 3GPP TS 36.211: E-UTRA Physical channels and modulation
  - 3GPP TS 36.321: E-UTRA MAC protocol specification
  - 3GPP TS 36.423: E-UTRAN X2 Application Protocol (X2AP)
  - 3GPP TS 36.104: E-UTRA BS radio transmission and reception

Claim Charts

- Claim charts of the patents related to Release-13 standards provides an analysis of the claim based on the features that are likely to be included in Release-13 standards. Release-13 will be available in 2016.

- Claim charts of the patents related to LTE-Advanced implementation provide a possible infringement scenario. Reverse engineering is required to complete these claim charts.

Claim Charts applicable to	No. of Patents
Release-11 Standards	17
LTE-Advanced Implementation	2
Release-13 Standards	16
Total	**35**

Conclusions

- This patent asset acquisition/licensing provides great opportunities to:
  - Vendors and service providers for defensive and offensive purposes
  - Investors and NPEs to license the patent assets
- The portfolio is available for sale/licensing immediately
- Acquisition/licensing of the patent portfolio provides a great return on investment

Appendix

Advantages of Invented Technologies in Ofinno LTE-Advanced Portfolio

Overview:

ePDCCH configurations are included in LTE-Advanced Release-11 handsets and networks, and they provide substantial advantages and will be required by LTE-Advanced service operators. Various features related to New Carrier Type are expected to be introduced in Release-13 and beyond, to increase spectral efficiency in LTE-Advanced technology. This article discusses these technologies and their importance.

1. ePDCCH Configuration and Signaling in R-11

ePDCCH is the enhanced Physical Downlink Control Channel specified in Release-11 of LTE to enhance the capacity, performance, and capability of the legacy PDCCH. This feature is an optional feature in LTE-Advanced Release-11, but it is a critical feature and is expected to be implemented in LTE-Advanced handsets and base stations. LTE-Advanced implementations without ePDCCH cannot benefit from the improved control channel spectral efficiency provided by ePDCCH. Furthermore, an LTE-Advanced deployment without ePDCCH is not suitable for implementation of co-channel heterogeneous networks, in which different femto, pico and micro/macro base stations operate in the same frequency.

The article "Enhanced Physical Downlink Control Channel in LTE Advanced Release 11" published in *IEEE Communications Magazine*, in February 2013 (by three Alcatel-Lucent R&D team members) highlights the issues and bottlenecks of using PDCCH in LTE-Advanced and describes the importance of implementing ePDCCH in an LTE-Advanced Network. The article indicates that low spectral efficiency, low capacity, and lack of scalability are the main drawbacks of using PDCCH alone in LTE-Advanced networks. The article highlights the importance of ePDCCH to resolve these issues, and further explains that ePDCCH enables inter-cell interference coordination (ICIC) for control channels in a dense network implementation and heterogeneous networks including small cells.

Wireless service operators including Verizon, AT&T, and Sprint have extensively deployed femto cell products. It is forecasted that with the start of LTE-Advanced implementation, deployment of the femto/small cells and heterogeneous network will see a substantial increase by 2016. For instance, Infonetics forecasts the global small cell market to grow rapidly, with about 3 million small cells shipping, and the market worth being about $2.1 billion in 2016 (http://www.infonetics.com/pr/2012/2H11-Small-Cell-Equipment-Market-Highlights.asp). Such a large scale deployment of small cells requires implementing ICIC techniques which in turn require configuration of ePDCCH in future LTE-Advanced networks. Therefore, it is certain that service operators will require implementation of ePDCCH in LTE-Advanced products. Discussions with LTE-Advanced technology experts in service operators indicate that major LTE wireless service operators have already included implementation of ePDCCH in their future LTE-Advanced network expansion roadmap.

Furthermore, 3GPP TS 36.523-1, "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification" for LTE-Advanced Release-11 already includes detailed protocol conformance specification for testing ePDCCH. Section "7.1.3.14: Correct handling of DL assignment / Dynamic case / EPDCCH" describes various test cases for certifying the operation of ePDCCH in an LTE-Advanced smartphone (UE). This indicates the importance of ePDCCH configuration and operation in an LTE-Advanced Release-11 network.

2. New Carrier Type in R-13 and Beyond

Introduction of New Carrier Type (NCT) enhances spectral efficiency of legacy LTE carriers by reducing signaling overhead. It also reduces interference from common reference signals in co-channel heterogeneous deployments. Many handset and base station vendors are actively contributing to this item in LTE-Advanced standardization process. NCT was initially planned for LTE Release 12 but its development has been pushed back to LTE Release 13 and beyond. The following are quotations from whitepapers published by NSN, Ericsson, and Huawei, as a few examples: http://www.slideshare.net/zahidtg/lte-release-12-and-beyond (NSN):
"The New Carrier Type will allow the optimization of small cells but can also be used in macro cells. Primarily, NCT will reduce common reference signal overhead and allow the operation of downlink control channels to be based on demodulation reference signals, in a stand-alone NCT solution. These generic optimizations are expected to be implemented in LTE Release 12

and will enable base station energy savings, flexibility in deployment and ways to reduce interference in HetNets, as well as performance gains for four transmit antenna and eight transmit antenna macro base station configurations. NCT can optimize small cell deployments through a significantly shortened latency and an extremely flexible duplex scheme."

www.ericsson.com/res/docs/whitepapers/wp-lte-release-12.pdf:

"The energy consumption of the power amplifiers currently available is far from proportional to the power-amplifier output power. On the contrary, the power amplifier consumes a non-negligible amount of energy even at low output power, for example when only limited control signaling is being transmitted within an "empty" cell.

Minimizing the transmission activity of such "always-on" signals is essential, as it allows base stations to turn off transmission circuitry when there is no data to transmit. Eliminating unnecessary transmissions also reduces interference, leading to improved data rates at low to medium load in both homogeneous as well as heterogeneous deployments. A new carrier type is considered for Release 12 to address these issues. Part of the design has already taken place within 3GPP, with transmission of cell-specific reference signals being removed in four out of five sub frames. Network energy consumption can be further improved by enhancements to idle-mode support."

www.huawei.com/ilink/en/download/HW_259010:

"Flexible spectrum utilization is a clear trend in the wireless industry. Carrier Aggregation technology introduced in LTE Rel-10 enables non-contiguous spectrum utilization and much more bandwidth support through combining the bandwidth from multiple component carriers. It is possible to further improve the spectrum efficiency of some component carriers with flexible bandwidth utilization and on-demand usage of common channels/signals that are part of the Rel-12 NCT work item."

THANK YOU!

ANY QUESTIONS ABOUT THIS PATENT SALE OFFERING SHOULD BE DIRECTED TO:

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