

Het-Net Data Traffic Forecast, 2013 – 2018

Market Study
First Quarter 2014





Het-Net Data Traffic Forecast, 2013 – 2018

A Market Study

Published First Quarter, 2014

Version 1.0

Report Number: 1Q2014-01

*i*GR Inc.
12400 W. Hwy 71
Suite 350 PMB 341
Austin TX 78738

Table of Contents

Abstract	1
Executive Summary	3
Figure A: Total U.S. Het-Net Data Demand, 2013-2018 (GB/Month)	4
Essence of Het-Nets	5
Macro cell coverage	5
Figure 1: Theoretical City with Cell Sites.....	5
Small cell coverage and capacity	6
Figure 2: Theoretical City with Smaller Macro Cells	6
Movement.....	7
Figure 3: Commute Routes in a Theoretical City.....	7
Pain points.....	8
Figure 4: Theoretical Bandwidth Pain Points in City X	8
Modeling Het-Nets	9
Table 1: AT&T In-Stadium Network Usage.....	9
Emerging Ways of Handling “Pain Points”	11
Identifying Pain Points	12
Different Types of Small Cells.....	13
Figure 5: One View of the Het-Net.....	14
Femtocells and Picocells	14
Defining a Metrocell	15
Where is it appropriate to deploy a small cell?.....	16
Het-Net Bandwidth Demand	17
Het-Net Data Demand	17
Table 2: Het-Net Bandwidth Demand, 2013-2018.....	17
Figure 6: HetNet Bandwidth Demand, 2013-2018 (GB/Month)	18
Distribution of data use by time of day	18
Table 3: Distribution of Mobile Data Usage per User per Hour (GB/hour), 2013 only	19
Figure 7: Het-Net Data Usage per Hour per User (GB/hour), 2013 only.....	20
Figure 8: Het-Net Data Usage on a Percentage Basis, 2013 only.....	20
Table 4: Distribution of Het-Net Data Usage per User per Hour (GB/hour), 2018 only.....	22
Figure 9: Het-Net Data Usage per Hour per User (GB/hour), 2018 only.....	23
Figure 10: Het-Net Data Usage on a Percentage Basis, 2018 only.....	24
Growth in data consumed by hour	24
Table 5: Comparing 2013 with 2018 (GB/day).....	24
Figure 11: Comparing 2013 with 2018 (GB/day).....	25
Methodologies.....	26
U.S. Connections Forecasts	26
<i>iGR's Usage Categories.....</i>	26
Mobile Data Demand Forecast.....	27

Quoting information from an *iGillottResearch* publication: external — any *iGillottResearch* information that is to be used in press releases, sales presentations, marketing materials, advertising, or promotional materials requires prior written approval from *iGillottResearch*. *iGillottResearch* reserves the right to deny approval of external usage for any reason. Internal-quoting individual sentences and paragraphs for use in your company's internal communications activities does not require permission from *iGillottResearch*. The use of large portions or the reproduction of any *iGillottResearch* document in its entirety does require prior written approval and may have some financial implications.

Copyright © 2014 *iGillottResearch*, Inc. Reproduction is forbidden unless authorized.

FOR INFORMATION PLEASE CONTACT IAIN GILLOTT (512) 263-5682.

U.S. Home Broadband and WiFi Usage Forecast.....	28
U.S. WiFi Offload Forecast	30
Why offload?	31
U.S. Het-Net Data Demand Forecast	32
Appendix	33
LIGHT USERS	33
Table 6: Light Users, 2013-2018.....	33
Table 7: Light User Het-Net Data Forecast, 2013-2018	33
Figure 12: Light User Het-Net Data Forecast, 2013-2018 (GB/Month).....	34
Table 8: Light User Het-Net Time of Day, 2013.....	34
Figure 13: Light User Het-Net Time of Day, 2013 (GB)	35
Figure 14: Light User Het-Net Time of Day (% Mix), 2013	36
Table 9: Light User Het-Net Time of Day, 2014.....	36
Figure 15: Light User Het-Net Time of Day, 2014 (GB)	37
Figure 16: Light User Het-Net Time of Day (% Mix), 2014	38
Table 10: Light User Het-Net Time of Day, 2015.....	38
Figure 17: Light User Het-Net Time of Day, 2015 (GB)	39
Figure 18: Light User Het-Net Time of Day (% Mix), 2015	40
Table 11: Light User Het-Net Time of Day, 2016.....	40
Figure 19: Light User Het-Net Time of Day, 2016 (GB)	41
Figure 20: Light User Het-Net Time of Day (% Mix), 2016	42
Table 12: Light User Het-Net Time of Day, 2017.....	42
Figure 21: Light User Het-Net Time of Day, 2017 (GB)	43
Figure 22: Light User Het-Net Time of Day (% Mix), 2017	44
Table 13: Light User Het-Net Time of Day, 2018.....	44
Figure 23: Light User Het-Net Time of Day, 2018 (GB)	45
Figure 24: Light User Het-Net Time of Day (% Mix), 2018	46
MEDIUM USERS	46
Table 14: Medium User Forecast, 2013-2014.....	46
Table 15: Medium User Het-Net Data Forecast, 2013-2014 (GB/Month)	46
Figure 25: Medium User Het-Net Data Forecast, 2013-2014 (GB/Month)	47
Table 16: Medium User Het-Net Time of Day, 2013	48
Figure 26: Medium User Het-Net Time of Day, 2013 (GB).....	49
Figure 27: Medium User Het-Net Time of Day (% Mix), 2013.....	49
Table 17: Medium User Het-Net Time of Day, 2014	50
Figure 28: Medium User Het-Net Time of Day, 2014 (GB).....	51
Figure 29: Medium User Het-Net Time of Day (% Mix), 2014.....	52
Table 18: Medium User Het-Net Time of Day, 2015	52
Figure 30: Medium User Het-Net Time of Day, 2015 (GB).....	53
Figure 31: Medium User Het-Net Time of Day (% Mix), 2015	54
Table 19: Medium User Het-Net Time of Day, 2016	54
Figure 32: Medium User Het-Net Time of Day, 2016 (GB).....	55
Figure 33: Medium User Het-Net Time of Day (% Mix), 2016	56
Table 20: Medium User Het-Net Time of Day, 2017	56
Figure 34: Medium User Het-Net Time of Day, 2017 (GB).....	57

Quoting information from an *iGillottResearch* publication: external — any *iGillottResearch* information that is to be used in press releases, sales presentations, marketing materials, advertising, or promotional materials requires prior written approval from *iGillottResearch*. *iGillottResearch* reserves the right to deny approval of external usage for any reason. Internal quoting individual sentences and paragraphs for use in your company's internal communications activities does not require permission from *iGillottResearch*. The use of large portions or the reproduction of any *iGillottResearch* document in its entirety does require prior written approval and may have some financial implications.

Copyright © 2014 *iGillottResearch*, Inc. Reproduction is forbidden unless authorized.

FOR INFORMATION PLEASE CONTACT IAIN GILLOTT (512) 263-5682.

Figure 35: Medium User Het-Net Time of Day (% Mix), 2017.....	58
Table 21: Medium User Het-Net Time of Day, 2018.....	58
Figure 36: Medium User Het-Net Time of Day, 2018 (GB).....	59
Figure 37: Medium User Het-Net Time of Day (% Mix), 2018.....	60
HEAVY USERS.....	60
Table 22: Heavy Users Forecast, 2013-2018	60
Table 23: Heavy User Het-Net Forecast, 2013-2018 (GB/Month)	60
Figure 38: Heavy User Het-Net Forecast, 2013-2018 (GB/Month)	61
Table 24: Heavy User Het-Net Time of Day, 2013.....	61
Figure 39: Heavy User Het-Net Time of Day, 2013 (GB)	62
Figure 40: Heavy User Het-Net Time of Day (% Mix), 2013	63
Table 25: Heavy User Het-Net Time of Day, 2014.....	63
Figure 41: Heavy User Het-Net Time of Day, 2014 (GB)	64
Figure 42: Heavy User Het-Net Time of Day (% Mix), 2014	65
Table 26: Heavy User Het-Net Time of Day, 2015.....	65
Figure 43: Heavy User Het-Net Time of Day, 2015 (GB)	66
Figure 44: Heavy User Het-Net Time of Day (% Mix), 2015	66
Table 27: Heavy User Het-Net Time of Day, 2016.....	67
Figure 45: Heavy User Het-Net Time of Day, 2016 (GB)	68
Figure 46: Heavy User Het-Net Time of Day (% Mix), 2016	69
Table 28: Heavy User Het-Net Time of Day, 2017.....	69
Figure 47: Heavy User Het-Net Time of Day, 2017 (GB)	70
Figure 48: Heavy User Het-Net Time of Day (% Mix), 2017	71
Table 29: Heavy User Het-Net Time of Day, 2018.....	71
Figure 49: Heavy User Het-Net Time of Day, 2018 (GB)	72
Figure 50: Heavy User Het-Net Time of Day (% Mix), 2018	73
Extreme Users	73
Table 30: Extreme Users Forecast, 2013-2018	73
Table 31: Extreme Users Het-Net Data Forecast, 2013-2018 (GB/Month).....	73
Figure 51: Extreme Users Het-Net Data Forecast, 2013-2018 (GB/Month).....	74
Table 32: Extreme Users Het-Net Time of Day, 2013	74
Figure 52: Extreme Users Het-Net Time of Day, 2013 (GB)	76
Figure 53: Extreme Users Het-Net Time of Day (% Mix), 2013	76
Table 33: Extreme Users Het-Net Time of Day, 2014	77
Figure 54: Extreme Users Het-Net Time of Day, 2014 (GB)	78
Figure 55: Extreme Users Het-Net Time of Day (% Mix), 2014	78
Table 34: Extreme Users Het-Net Time of Day, 2015	79
Figure 56: Extreme Users Het-Net Time of Day, 2015 (GB)	80
Figure 57: Extreme Users Het-Net Time of Day (% Mix), 2015	80
Table 35: Extreme Users Het-Net Time of Day, 2016	81
Figure 58: Extreme Users Het-Net Time of Day, 2016 (GB)	82
Figure 59: Extreme Users Het-Net Time of Day (% Mix), 2016	82
Table 36: Extreme Users Het-Net Time of Day, 2017	83
Figure 60: Extreme Users Het-Net Time of Day, 2017 (GB)	84
Figure 61: Extreme Users Het-Net Time of Day (% Mix), 2017	84
Table 37: Extreme Users Het-Net Time of Day, 2018	85

Quoting information from an *iGillottResearch* publication: external — any *iGillottResearch* information that is to be used in press releases, sales presentations, marketing materials, advertising, or promotional materials requires prior written approval from *iGillottResearch*. *iGillottResearch* reserves the right to deny approval of external usage for any reason. Internal quoting individual sentences and paragraphs for use in your company's internal communications activities does not require permission from *iGillottResearch*. The use of large portions or the reproduction of any *iGillottResearch* document in its entirety does require prior written approval and may have some financial implications.

Figure 62: Extreme Users Het-Net Time of Day, 2018 (GB)	86
Figure 63: Extreme Users Het-Net Time of Day (% Mix), 2018	86
HetNet Vendor Profiles	87
Advanced RF Technologies, Inc. (ADRF).....	87
Airspan Networks	88
Airvana LLC	90
Figure 64: Airvana Femtocell Solution	91
Alcatel-Lucent.....	93
Argela	95
AT&T, Inc.	98
Axell Wireless / Cobham	99
Betacom Incorporated	102
Bright House Networks, LLC	103
BTI Wireless	104
C Squared Systems.....	106
Cablevision Systems Corporation	108
CellO (formerly Optiway)	109
Figure 65: OTDMILL Technology	109
Figure 66: RefAccess Technology	110
CSI (Cellular Specialties, Inc.)	112
CenturyLink, Inc.	114
Charter Communications, Inc.	115
Cisco	116
Figure 67: Cisco Small Cell Solution	117
Figure 68: Cisco SP WiFi Solution	118
Comba Telecom	119
Comcast Corporation	121
CommScope.....	123
Connectivity Wireless Solutions	125
Corning MobileAccess	127
Figure 69: MobileAccess Total DAS Solution.....	129
Cox Communications	131
Crown Castle / NextG Networks.....	132
Figure 70: Crown Castle DAS Solution	133
Figure 71: Crown Castle DAS Solution	133
Ethertronics	135
Ericsson	138
ExteNet Systems	141
Galtronics	143
Gemtek.....	144
Figure 72: Gemtek LTE Gateway	146
Huawei	146
iBwave.....	148
Inner Wireless/Black Box Network Services	150
ip.access	152

Quoting information from an *iGillottResearch* publication: external — any *iGillottResearch* information that is to be used in press releases, sales presentations, marketing materials, advertising, or promotional materials requires prior written approval from *iGillottResearch*. *iGillottResearch* reserves the right to deny approval of external usage for any reason. Internal quoting individual sentences and paragraphs for use in your company's internal communications activities does not require permission from *iGillottResearch*. The use of large portions or the reproduction of any *iGillottResearch* document in its entirety does require prior written approval and may have some financial implications.

Juni	155
Figure 73: Juni Gateway	156
Mindspeed Technologies, Inc.	157
NEC	159
NSN (Nokia Solutions and Networks)	162
Oracle Acme Packet	166
Figure 74: Oracle Acme Packet Net-Net Security Gateway	167
Powerwave Technologies	168
Public Wireless	170
PureWave Networks	172
Quortus	174
RFS - Radio Frequency Systems	175
Ruckus Wireless	177
Figure 75: Ruckus WiFi Offload Solution.....	178
Samsung Electronics	180
Sercomm	182
SOLiD Technologies	183
Solutelia	185
SpiderCloud Wireless	186
Taqua LLC	188
TE Connectivity	190
Tempest Telecom Solutions	193
Time Warner Cable	194
Ubee-Airwalk	196
Ubiquisys – Now part of Cisco	198
Verizon Wireless	200
Zinwave	202
Figure 76: Zinwave System 3000 DAS	203
ZTE Corporation	205
Definitions	208
General	208
Device Types	208
Services	209
Network Technology	210
About iGR	214
Disclaimer	214

Quoting information from an *iGillottResearch* publication: external — any *iGillottResearch* information that is to be used in press releases, sales presentations, marketing materials, advertising, or promotional materials requires prior written approval from *iGillottResearch*. *iGillottResearch* reserves the right to deny approval of external usage for any reason. Internal-quoting individual sentences and paragraphs for use in your company's internal communications activities does not require permission from *iGillottResearch*. The use of large portions or the reproduction of any *iGillottResearch* document in its entirety does require prior written approval and may have some financial implications.

Abstract

People move around and they use devices and data, and they use them a bit more everyday. The better the device and the network, the easier it becomes to rely less on the local storage of content (music, video, etc.) and more on accessing what they want from the “cloud.”

During certain times of the day – commute, lunch, etc. – people may move about, turn on a mobile device for entertainment or work purposes and start using data. If 1,000 people do that at the same time in a small geographic area, the macro cellular data network will likely be unable to deliver the required bandwidth thus creating data demand “pain points” in any given city or town.

The model set forth in this report, then, addresses several key questions:

- How much cellular data will be consumed in the U.S. through 2018
- How much wired home broadband data will be consumed in the U.S. through 2018
- How much WiFi offload data traffic will be used in the U.S. through 2018
- Combines each of the above forecasts with a time of day variable that shows when data usage “spikes” or “pain points” are likely to occur and the magnitude of these spikes.
- Taken all together, this creates a heterogeneous network (het-net) forecast that shows, on average, how much data is being used on which network.

Key questions addressed:

- What consists of het-net data traffic?
- What is het-net data usage like today?
- How does het-net data usage change over the forecast period?
- How does het-net data usage change by user profile?
- What are the drivers of het-net data traffic growth?
- How does the het-net data forecast change over the forecast period?

Who should read this report?

- Mobile operators
- Device OEMs
- Mobile infrastructure vendors

Quoting information from an *iGillottResearch* publication: external — any *iGillottResearch* information that is to be used in press releases, sales presentations, marketing materials, advertising, or promotional materials requires prior written approval from *iGillottResearch*. *iGillottResearch* reserves the right to deny approval of external usage for any reason. Internal quoting individual sentences and paragraphs for use in your company's internal communications activities does not require permission from *iGillottResearch*. The use of large portions or the reproduction of any *iGillottResearch* document in its entirety does require prior written approval and may have some financial implications.

Copyright © 2014 *iGillottResearch*, Inc. Reproduction is forbidden unless authorized.

FOR INFORMATION PLEASE CONTACT IAIN GILLOTT (512) 263-5682.

- Tower companies and operators
- Mobile backhaul vendors
- Content providers and distributors
- Financial analysts and investors.

Quoting information from an *iGillottResearch* publication: external — any *iGillottResearch* information that is to be used in press releases, sales presentations, marketing materials, advertising, or promotional materials requires prior written approval from *iGillottResearch*. *iGillottResearch* reserves the right to deny approval of external usage for any reason. Internal-quoting individual sentences and paragraphs for use in your company's internal communications activities does not require permission from *iGillottResearch*. The use of large portions or the reproduction of any *iGillottResearch* document in its entirety does require prior written approval and may have some financial implications.

Copyright © 2014 *iGillottResearch*, Inc. Reproduction is forbidden unless authorized.
FOR INFORMATION PLEASE CONTACT IAIN GILLOTT (512) 263-5682.