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Netmanias, based in South Korea, is a professional networking consulting company providing insightful online/off-line media content generated by in-depth analysis of the mobile network technology/service/market in South Korea and around the world.

We have a team of dedicated and skilled analysts and reporters who make sure the latest, hottest topics, like LTE, 5G, IoT, Broadband, etc., are covered through posts on our website and in our cutting edge quarterly networking magazine, "Korea Communication Review." Netmanias has over 51,000 subscribers who are actively working in the networking industry and over 250,000 unique visitors per year.



Harrison J. Son, CEO

Netmanias Korean Site (www.netmanias.com/ko)

The screenshot shows the Korean version of the Netmanias website. It features a navigation bar with categories like Reports, Technical Documents, Blog, and One-Shot Gallery. The main content area includes a featured article titled 'GiGAtopia' and several news items such as 'KT 4K IPTV (4K UHD) 서비스' and 'Streaming Rate (Encoding Rate)'. There are also pie charts showing analytics for South Korea (52%) and other regions.

Netmanias English Site (www.netmanias.com/en)

The screenshot shows the English version of the Netmanias website. It features a navigation bar with categories like Reports, Technical Documents, Tech-Blog, and One-Shot Gallery. The main content area includes a featured article titled 'GiGAtopia' and several news items such as 'KT GiGAtopia: What's promised and what's delivered' and 'KT IPTV (4K UHD): Live TV (4) 4K UHD VoD'. There are also pie charts showing analytics for South Korea (52%) and other regions.

English Magazine (KCR - printed)



CIRCULATION: 5,000+

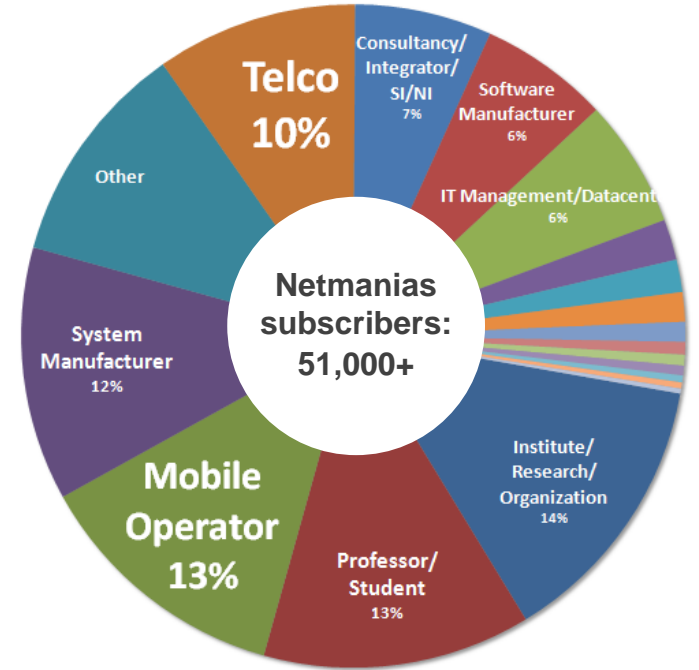
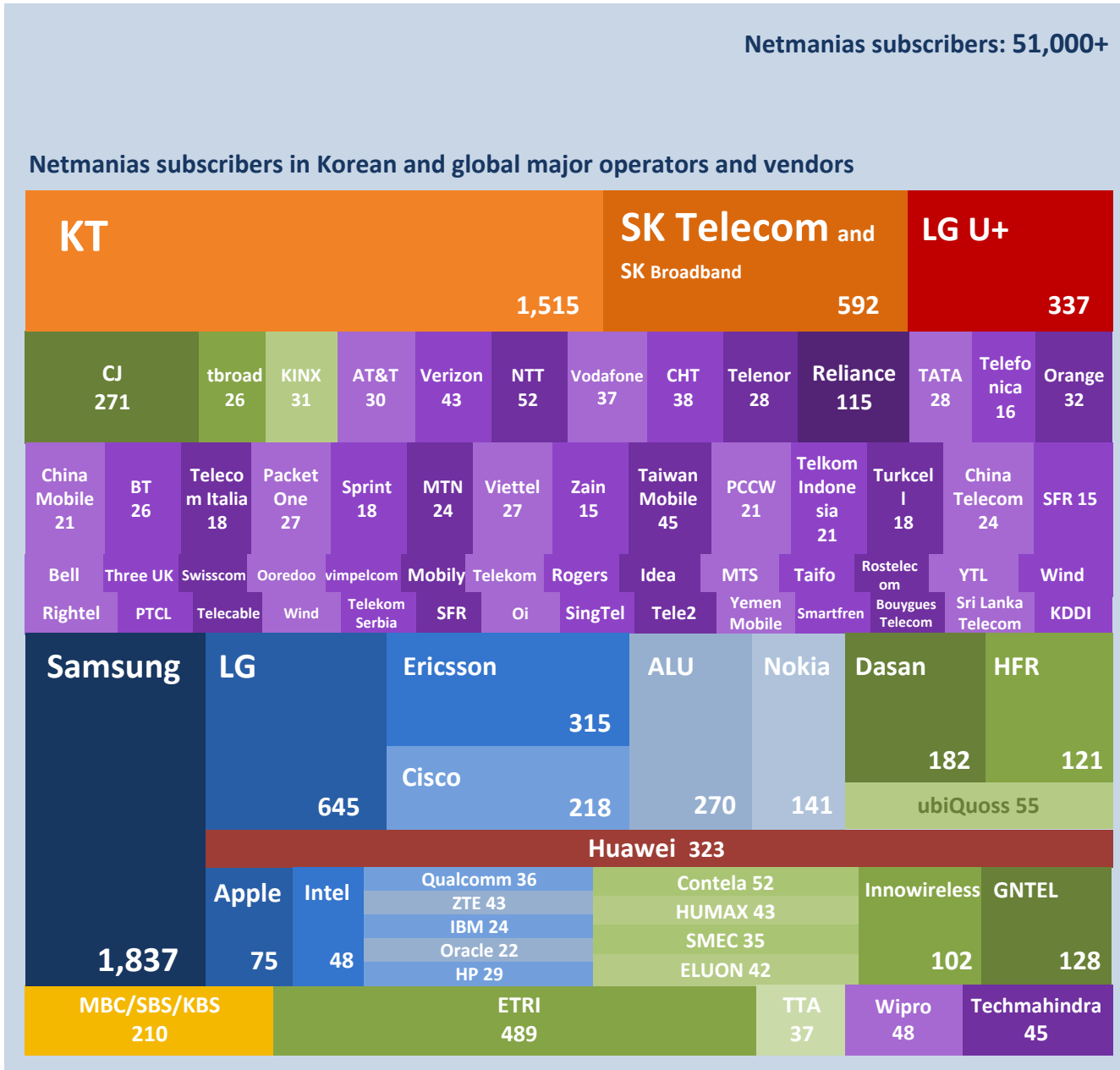
Korean Communication Review (KCR) magazine is published in January, April, July and October and distributed to Netmanias' subscribers, managements of Korean ICT companies and government.

Additional copies will be distributed at several industry Shows in 2015, including MWC 2015 (Barcelona, Shanghai), CeBIT 2015, Small Cell & Carrier Wi-Fi World Summit (Singapore, London, Dubai, Dallas), Metro Ethernet Forum, KRNET 2015, HSN 2015.

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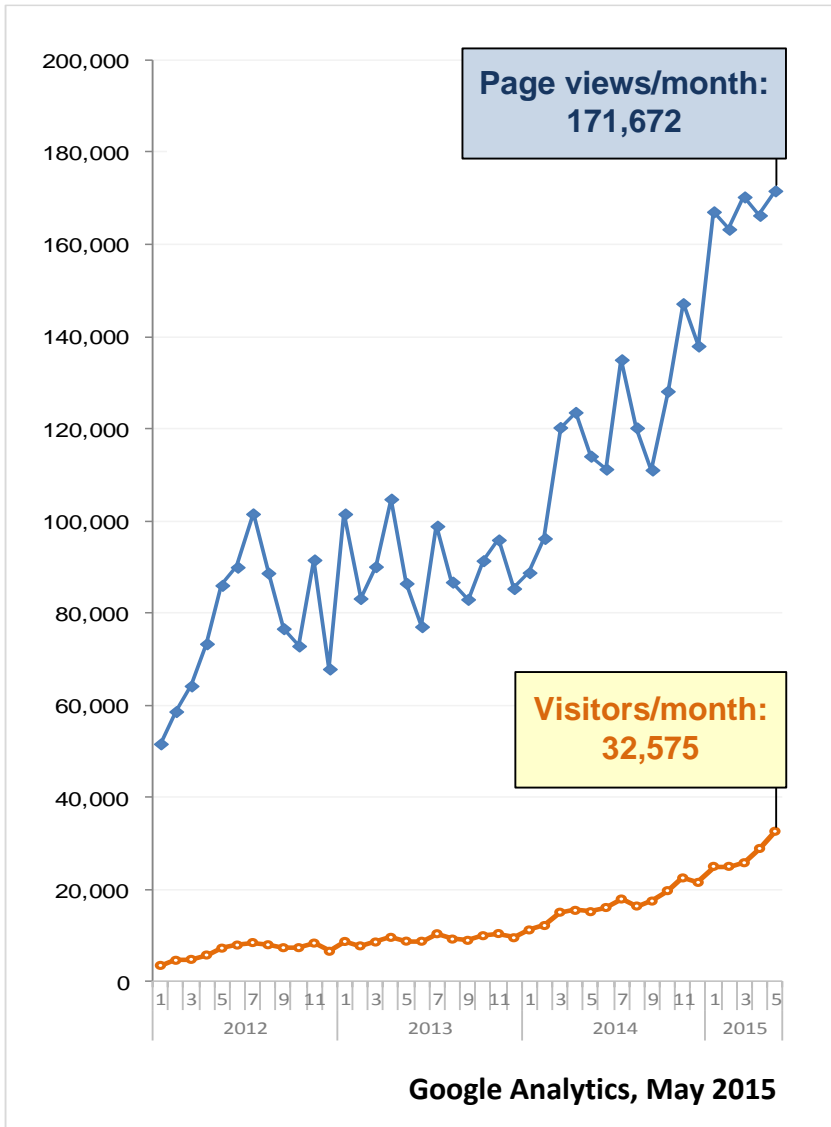
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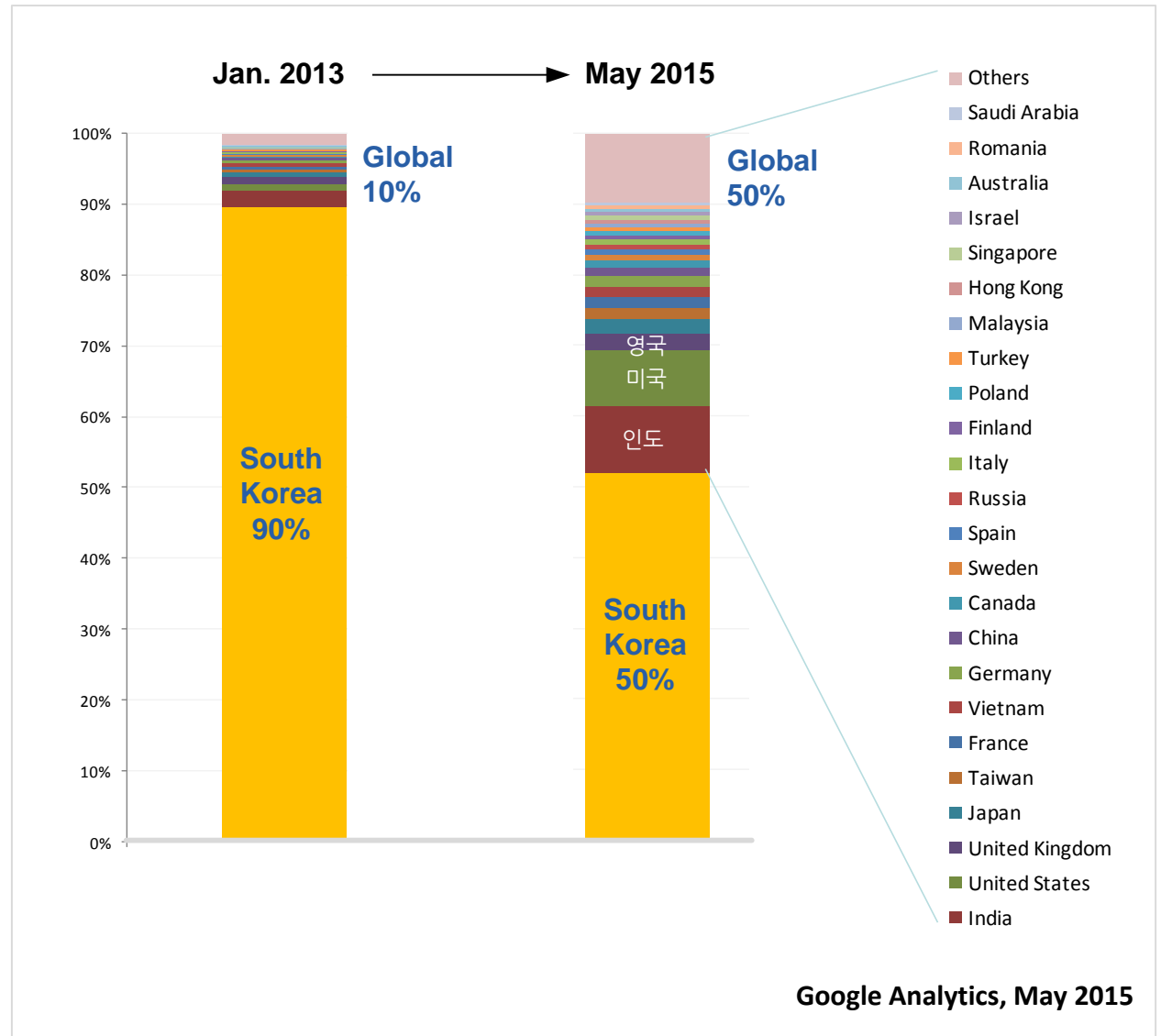


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Visitors and Page Views



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KCR (Korea Communication Review) Magazine



ISSN 2384-2792

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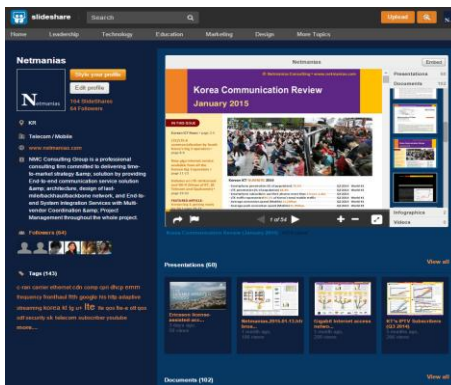
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KCR

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July 2014	15,376
October 2014	14,190
January 2015	13,692
April 2015	9,526

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At global events
 • CeBIT 2015 in Germany • 2014 Metro Ethernet Forum • WIS 2014 • WIS 2015
At domestic events
 • KRNAT • HSN, etc.

Distribution through Our Global Partners



At global events hosted By Avren Event

• Small Cell, Carrier Wi-Fi and Mobile Backhaul ASIA Summit (Singapore) in April 2015 • Small Cell & Carrier Wi-Fi World Summit (London) in June 2015

At MWC events Hosted by GSMA

• MWC (Spain) in March 2015 • MWC (Shanghai) in July 2015

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Commercialization Status of LTE-LTE and LTE-WiFi Carrier Aggregation in Korea (June 30, 2015)

Reports Technical Documents Tech-Blog **One-Shot Gallery**



Commercialization Status of LTE-LTE and LTE-WiFi Carrier Aggregation in Korea (June 30, 2015) NEW

07/10/2015

KT, Korea, LG U+, LTE, SK Telecom,

KOREAN ICT NEWS

- LG U+'s new services: 'LTE Video Portal' and 'Home IoT' 06/29/2015
- Samsung Electronics and SK Telecom to jointly develop SDN PoC f or LTE Core Network 06/25/2015
- A Generation Where 'GIGA Internet is connected through a Phone Line' Is starting...There is bounce on Expansion Of GIGA... 06/24/2015
- World's First Inter-Carrier VoLTE Service available in November 06/23/2015
- SK Telecom-Ericsson successfully demonstrate 5G Small Cell with Ultra-Low Inter-Cell Interference 06/23/2015
- KT's GIGA LTE, World's First Commercial Wireless 1 Giga (3-band CA + GIGA WIFI) 06/17/2015
- SK Telecom opens ThingPlug, an Integrated IoT Platform based on oneM2M Standards 06/10/2015
- DASAN Networks introduces Next-Generation Gigabit Internet Solutions in CommunicAsia and K-Global 2015 06/03/2015
- Samsung Succeeds In Demonstrating World's First Public Safety Communication Net Based On 'PS-LTE'-Standard 06/03/2015
- KT Skylife Commercializes World's First 3 UHD Channels - Opens UHD Multi-Channel Generation 06/03/2015

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4K UHD VoD contents provided by Korean Big 3 Telco (June 30, 2015)

07/02/2015

4K, IPTV, KT, Korea, LG U+, SK

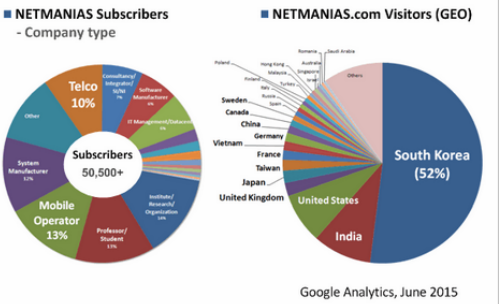
Korea Telco Market 2015

06/30/2015

Broadband, IPTV, KT, Korea, LG U+,

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- A question on the sequence diagram differences of of fixed and dynamic address allocation: 'In dyna... NEW 07/10/2015
- Hi, This is sriakshmi. could you please share a document on LTE 07/09/2015

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Commercialization Status of LTE-LTE and LTE-WiFi Carrier Aggregation in Korea (June 30, 2015)

NETMANIAS TECH-BLOG
List

LG U+ achieved 600Mbps in its second LTE-U demonstration

June 15, 2015 | By Dr. Michelle M. Do (tech@netmanias.com)

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In its second demonstration of LTE in Unlicensed spectrum ("LTE-U", LAA in 3GPP term) conducted last month - 7 months after its first demonstration where it showed 300 Mbps through CA of 20 MHz at 2.6 GHz and another 20 MHz at 5.8 GHz, LG U+ successfully achieved 600 Mbps through carrier aggregation (CA) of 20 MHz at 2.6 GHz and 60 MHz (3 x 20 MHz) at 5.8 GHz.

With LTE-U not even standardized yet, Korean operators are already in fierce competition in the new technology. LG U+ has been apparently leading the race so far, tightly followed by its competitors SK Telecom and KT, who also showcased 450 Mbps LTE-U, with Ericsson/Qualcomm in February, and with Samsung/Qualcomm in March, respectively. LG U+, with two successful demonstrations, said it is currently working on commercialization of the technology.

Then why are all the operators so obsessed with LTE-U demonstration, especially LG U+?

First, let's see what is going on in the Korean communication market now. Korean LTE market is already pretty mature. As of 2015 Q1, it has i) 66% of LTE subscription, ii) 120 PB of LTE data usage, which accounts for 96% of its total mobile data usage, and iii) 3.4 GB of monthly average data usage per LTE subscriber.

The operators all have 40 MHz of LTE bandwidth (DL), and support up to 300 Mbps through 3-band CA (as of 2015 Q1). So far, they all somehow have managed to secure additional LTE frequencies gradually (10→20→30→40 MHz), offering faster speeds through CA. But, they are about to face a harder battle. At the end of the year, an auction for 700 MHz, 2.1GHz and 2.6GHz bands is scheduled. Especially, to get a wideband (20MHz) frequency, the 3 operators will have to compete not only with each other, but also with local over-the-air broadcasters requesting UHD channels, a possible 4th mobile operator, etc. Besides, the Korean government's policies on frequency allocation and the astronomical frequency costs are imposing a big burden on the operators.

LTE-U is a radio access technology that is designed to use 5 GHz unlicensed band, mostly used for WiFi so far, for LTE purpose as well. So, the technology will allow the band to serve pretty well as a supplementary band (of more than dozens of MHz) for LTE, although not as a dedicated, primary band like licensed bands do. For the operators who are under pressure to deal with issues like growing traffic, frequency shortage, and high costs of frequency, LTE-U certainly sounded like an attractive alternative.

The output power is limited to low power in the 5 GHz unlicensed band. So small cells are most likely to be the first place where commercialized LTE-U will be employed. Also, indoor/outdoor hotspots or in-building solutions are expected to be the first target of the new technology deployment.

We had a chance to discuss with a member of LG U+ Access Network Development Team who conducted the LTE-U demonstration last month. Below we will briefly review what we learned from him about their LTE-U demonstration, target areas, and commercialization plan, one at a time.

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KT 활창규 회장이 작년 5월 20일 KT 비전으로 기가토피아(GiGAtopia)를 제창했다. 핵심 포인트는 유무선 기가 액세스망을 실현하겠다는 것과 이를

07/16/2015

Gigabit Internet, KT, Korea, LTE,

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- LG전자 국내 '올레드 TV 라인업 두 배로 늘린다' [\[기사\]](#) 아이뉴스24
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- 예에서, 고성능 울트라북 '아스파이어 E51 시리즈' 출시 [\[기사\]](#) 전자신문
- 요즘 삼성 스마트폰 디자인의 흐름 [\[기사\]](#) K모바일
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Google Analytics, 2015년 6월

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KT IPTV (olleh GIGA UHD tv) 서비스 (2): 실시간 인기채널
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NETMANIAS BLOG

KT 기가토피아 1년 - 황창규 전략은 성공했나?

KT GiGAtopia

July 16, 2015 | By 손장우 (tech@netmanias.com)

KT 황창규 회장이 작년 5월 20일 KT 비전으로 기가토피아(GiGAtopia)를 제창했다. 핵심 포인트는 유무선 기가 액세스망을 실현하겠다는 것과 이를 위해 3년간 4.5조원을 투자하겠다는 것이다. 기가토피아라는 비전을 선언한지 1년이 넘는 지금, 그 동안 KT가 어떠한 혁신들을 이루어 냈는 지 정리해보자.

무엇을 하겠다고 했나?

작년 5월 KT가 제시한 기가토피아: 속도전 선포 - 빠른 것은 여전히 옳다.

- 기가 인터넷: 기존 100Mbps인 가정에 기가급 인터넷 접속 속도를 제공하겠다
 - 기가 FTTH: 광케이블이나 UTP가 인입되어 있는 가구는 1Gbps, 500Mbps를 제공하겠다.
 - 기가 와이어: 전화선만 인입되어 있는 가구도 대략 300Mbps를 제공하겠다.
- 기가 와이파이 홈: 대내 기가급의 와이파이 속도를 제공하겠다.
- 기가 LTE-A: 모바일 단말의 데이터 속도를 LTE-A기술을 통해 기존 150Mbps에서 300Mbps급으로 개선시키겠다.
- 기가 패스: 모바일 단말의 데이터 속도를 와이파이와 연동시켜 기존 150Mbps에서 450Mbps로 개선시키겠다.

현재까지 무엇을 이루었나?

2014.05 기가토피아 비전 선언

2015.06 기가 패스 (GIGA LTE) 1.17 Gbps

2014.10 기가인터넷 1Gbps (국내최초)

2015.01 기가 LTE-A (3-Band LTE-A) 300 Mbps (세계 최초)

2014.06 Wideband LTE-A 225 Mbps (세계 두번째)

2013 기가인터넷 500Mbps

2014 기가인터넷 1Gbps

2015 기가 와이파이홈 867 Mbps

2013 유선속도

2013 무선속도

5. 기가 인터넷 (GIGA FTTH, GIGA UTP, GIGA Wire): 작년 10월 국내 최초로 기가인터넷(E-PON과 Ethernet Switch기반)을 상용화했다. 1Gbps와 500Mbps의 인터넷 속도를 제공한다. 서비스 개시 후, 2개월 만에 가입자 10만, 2015년 3월 가입자수 20만, 4월엔 30만을 돌파했다.

새글 (New Comment) [모두 보기](#)

- band LTE WiFi(SKT)와 GIGA LTE(KT)는 6월 16일에 결핵시 S6/S6 옛치 소프트웨어 업데이트를 통해 같이... [\[기사\]](#) 07/27/2015
- MP-TCP와 SCTP 비교를 보면 SCTP는 NAT 환경에서 문제가 있다는 내용이 항상 나오는데요. 잘 아시는분께서 이부분에... [\[기사\]](#) 07/26/2015
- 여기 블로그의 "LTE와 Wi-Fi 네트워크 연동 구조 (4편: 모든 Wi-Fi 트래픽은 P-GW를 통해서만 하는가?)&... [\[기사\]](#) 07/26/2015

Yon. 님 가사하! NCH! 처음에는 Mirechark 버전 1.6.0 오픈 Capture

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- > World's most advanced broadband wired/wireless services by Korean operators
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Korea Communication Review (KCR) magazine >>

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outdoor cell work indoor as well, allowing its coverage to extend indoors.

Benefits: DAS distributes RF signals to antennas, and can deliver different Radio Access Technologies (RAT) like CDMA, WCDMA, LTE, etc., all through a single optic/RF cable (technology-neutral). Plus, since a single cell covers both indoors and outdoors, no quality degradation is caused by inter-cell interference or handover.

Drawbacks: DAS has too many components (attenuator, donor unit, remote unit, splitter, coupler, booster, etc.), which means complicated installation, longer construction period, and higher construction costs. But, what is even worse is that it has poor scalability which will make it hard to increase capacity when needed in the future - a serious drawback in this era of soaring data traffic. Also, all antennas used in DAS require individual power adjustment. Besides, if any of them fails, it is hard to detect the one that failed. Because outdoor cell resources are shared, high-speed data usage can be limited.

but also good capacity. In addition, installing process should be fast and inexpensive. To satisfy all these requirements, SK Telecom's DAS is evolving to ensure:

- **Cheaper and faster installation using UTP cabling:** To save costs of cabling, which often is the No. 1 cost-increasing factor in DAS installation, economical and scalable standardized UTP cables are used instead of RF cables.
- **Remote management:** A smart antenna unit with both antennas and RF transmission control modules is introduced. A smart antenna unit reports radio signal measurements and status information, and remotely performs tasks like configuration, status check, fault management, etc., allowing for remote optimization.
- **Increased capacity:** MIMO and CA are supported for increased capacity. MIMO requires more antennas because it allows different types of radio signals to be sent within the same frequency band. CA combines radio signals from different frequency bands, and thus requires more frequency bands. Although in need of more frequency bands than MIMO, it can take advantage of SISO mode, doubling the speeds at devices.

In-building solution I: DAS Evolution
Because LTE serves more data than voice, DAS should be able to provide not only good coverage,

In-building

Conventional DAS

DAS Evolution

SK Telecom's CO

Front-haul: Active WDM

Tens of BBU (connecting 100s of RRHs)

EPC

MU: Master Unit
RU: Remote Unit
ATT.: Attenuator

of CO = 400
of BBU Macro Cell = 300
of RRHs = 180,000

C-RAN: Centralized/Cloud RAN
BBU: Baseband Unit
RRH: Remote Radio Head
SCAN: Smart Cloud Access Network

Figure 2. Architecture of DAS evolution

Evolution of SK Telecom's in-building LTE solutions | Steve Shin and Dr. Michelle M. Do [tech@netmanias.com]

3. Post your PR materials at Netmanias website (Korean and English) and KCR *as needed*

3-1 in Netmanias Web Page (Korean and English)

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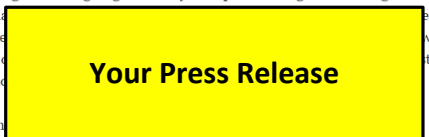
SK Telecom Collaborates with Intel on 5G Enabling Technologies

07/16/2015 | By NETMANIAS (tech@netmanias.com)

SK Telecom collaborates with Intel on 5G Enabling Technologies

- Companies will collaboratively develop and verify 5G device prototypes as well as key 5G technologies including 'Anchor-Booster Cell' and 'Massive MIMO'
- SK Telecom's CTO to speak on the company's 5G vision at GTI Summit and GSMA Conference held during MWC Shanghai 2015

SK Telecom today announced that it extended its strategic collaboration with Intel to cooperate on the development and performance verification of 5G technologies. The signing ceremony took place during MWC Shanghai 2015, Asia's largest mobile communications event.



To demonstrate the feasibility of 5G commercialization, it is essential to develop a modem device that supports not only 5G, but also the existing 3G and LTE networks and ensures seamless interworking among multiple RAT(Radio Access Technology)s. To this end, the two companies will work together to develop and verify 5G devices that are similar size to the existing LTE devices for frequency bands that are highly likely to be used for pre-5G demonstrations and 5G commercialization.

SK Telecom and Intel will also further their efforts on Anchor-Booster Cell, one of the core 5G technologies that enables seamless transmission of massive amounts of data via a combination of an LTE network and next-generation wireless LAN called WiGig*.

*WiGig (Wireless Gigabit Alliance), also implemented in IEEE 802.11ad, enables multi-gigabit speed wireless communications over the unlicensed 60 GHz frequency band.

The WiGig specification not only allows devices to communicate at multi-gigabit speeds, but also consumes much less power to prolong battery life. WiGig is expected to support about 10 times faster speeds than Wi-Fi, allowing users to download a full HD movie (4-10GB) in just one to two seconds.

The two companies will apply Mobile Edge Computing technology on the Anchor-Booster cell to further enhance 5G by improving QoE(Quality of Experience), and developing new business models for enterprises and key verticals.

SK Telecom and Intel also agreed to develop and verify 'Massive MIMO (Multiple-Input Multiple-Output), a multiple antenna technology that

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Current Issue	Jan. 2015
Q2 2015 <ul style="list-style-type: none">KT's demonstrations of LTE TDD (9-carrier CA, LTE-U/DL CA and triple mode femto)KT's demonstrations of LTE-H and LTE-USK Telecom: Big data-based intelligent operation platforms - Fast Data PlatformIoT services available from Korean OperatorsKorea ICT Statistics	<ul style="list-style-type: none">Debates on LTE-Unlicensed and Wi-Fi (KT, SK Telecom, Qualcomm, etc.)Korea's Big 3 now all offer giga Internet serviceEthernet Access at 10GbpsLTE Statistics in KoreaBroadband subscribers in KoreaIPTV subscribers in Korea
October 2014 <ul style="list-style-type: none">SK Telecom's Network Evolution Strategies: Carrier aggregation, inter-cell coordination and C-RAN architectureKT aims to build a nationwide GIGA Internet access network (1 Gbps to the home) by the end of the yearKorean big 3 telcos offer hassle-free and instant upgrade to Giga-class Internet without re-cablingLTE Statistics in KoreaBroadband subscribers in KoreaIPTV subscribers in Korea	July 2014 <ul style="list-style-type: none">What's GiGATopia envisioned by Chairman Chang-gyu Hwang of KT?LTE/LTE-A Commercialization by South Korea's Big 3 OperatorsBroadband Access Network Architecture in KoreaNetmanias Vendor Interview: HFR's optical fronthaul solutionLTE Statistics in KoreaBroadband subscribers in KoreaIPTV subscribers in Korea

3-2 in English KCR Magazine

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Korea ICT News & Articles

Samsung Electronics and SK Telecom to jointly develop SDN PoC for LTE core network

06/25 | By NETMANIAS (tech@netmanias.com)

Samsung Electronics announced on the 25th that it will partner with SK Telecom, to develop a Software Defined Networking (SDN) Proof of Concept (PoC) for an LTE core network. Both companies have recently announced their plans to develop virtualized, software-based networking solutions.

SDN is one of the hottest, and most interested next generation technologies, and many global players have been paying keen attention to developing new SDN solutions and services. SDN is designed to separate control and data plane in network equipment in order to create more efficient transmission routes.

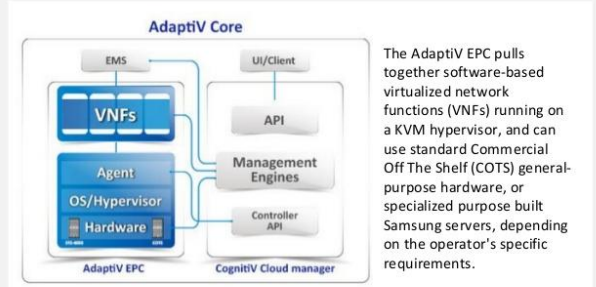
An SDN-enabled Evolved Packet Core (EPC) solution is known for the ability to offer optimized traffic routes according to types of subscribers and services, without having to go through the core network.

Using this solution, operators can determine the shortest routes for data delivery, improve QoE, and reduce undesired network overload. In addition, they can handle network fault fast and keep investment costs down.

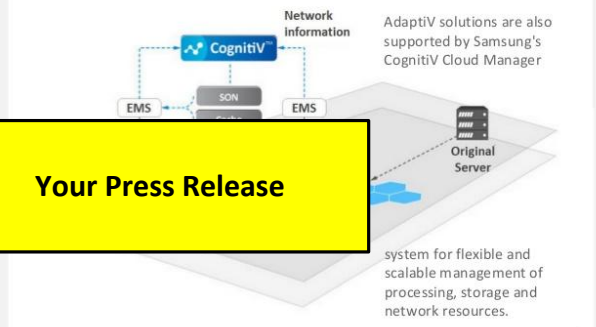
What is great about SDN is that it can offer different and flexible network services to each subscriber according to their selected plans (Network as a Service), while still using the current network (Network Slicing).

Because of these benefits, large-scale organizations like corporations, universities, public institutions, etc. can enjoy the convenience of using private network services through the networks already built by operators, without the hassle of building a new network themselves.

Plus, SDN is expected to significantly



The AdaptiV EPC pulls together software-based virtualized network functions (VNFs) running on a KVM hypervisor, and can use standard Commercial Off The Shelf (COTS) general-purpose hardware, or specialized purpose built Samsung servers, depending on the operator's specific requirements.



Source: Samsung

lower the risk of data leakage because it allows for delivering of important, confidential data directly via base stations nearby, instead of delivering through the public Internet network.

So, it can be useful for large-scaled organizations like corporations, hospital, public institutions, etc.

Also, because SDN makes sure data travel via the shortest routes near the base station, lower latency can be achieved. This will make many real-time, latency-critical data services to be available in the coming 5G era, like cloud games, remote driving, etc., a reality.

The two companies plan to lead the next generation network innovation in the global market, through cooperation in development of SDN-enabled EPC

equipment and standardization by October.

Jin-hyo Park, Head of Network Technology Center at SK Telecom noted, "SDN is one of the key next generation technologies for innovation of network and cloud infrastructure of operators." He continued, "We are planning to effectively accommodate ever-increasing mobile data traffic through new EPC equipment development, and offer differentiated multimedia service experiences."

"Software-based technologies such as Network Function Virtualization (NFV) and SDN are key enablers for innovative services and efficient network operations," said Dong-Soo Park, Executive Vice President and Head of R&D for Network Business at Samsung Electronics. ■



4. Publish promotional materials (e.g., whitepaper) at Netmanias website (Korean and English) and KCR

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Why WDM is essential in C-RAN fronthaul networks? - Ultra high CPRI link capacity
March 12, 2014 | By Steve Shin and Dr. Harrison J. Son (tech@netmanias.com)

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Our question in this post is: Why does the CPRI link between BBU (at CO) and RRH (at Cell Site) in C-RAN require an ultra high Gbps bandwidth?

Before you read this post, we advise you to read our previous post, "CPRI (1): Emergence of C-RAN and CPRI overview".

The CPRI link capacities required between BBU and RRH in the C-RAN architecture are as follows:

Table 1. CPRI data rates in function of radio technologies

Antenna configuration	LTE Bandwidth	
	10 MHz	20 MHz
2x2 MIMO	1.2288 Gbps (IP rate 75Mbps)	2.4576 Gbps (IP rate 150Mbps)
4x2 (4x4) MIMO	2.4576 Gbps (IP rate 150Mbps)	4.9152 Gbps (IP rate 300Mbps)
8x2 (8x4, 8x8) MIMO	4.9152 Gbps (IP rate 300Mbps)	9.8304 Gbps (IP rate 600Mbps)

* Source: CPRI Specification v6.0 (Aug. 30, 2013)

In case of a network with LTE Carrier BW of 20MHz and 2x2 MIMO antenna configuration, the maximum IP throughput in the cell is only 150Mbps. So theoretically, a backhaul network with 150 Mbps should be able to handle the traffic. In reality, however, a CPRI link between BBU (at CO) and RRH (at Cell Site) requires a bandwidth as high as 2.4576Gbps. Why such a high bandwidth is needed?

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[Sponsor Content] HFR's Broadband Solutions Brief
January 13, 2015 | By Netmanias (tech@netmanias.com)

HFR's Broadband Solutions Brief
HFR broadband access solutions enable telecom operators to offer full range of revenue generating services in a simple and smart manner. HFR is currently providing all three broadband solutions - FTTH, FTTB-LAN, and FTTB-VDSL, allowing telecom operators to deliver ultra high-speed Internet (100M, 500M, and 1Gbps) to users in different housing types.

Case Study: SK Broadband
Household Penetration of FTTH/FTTB-LAN by Country

Comparison of the HFR FTTH/FTTB family features

HFR Portfolio	HT700-0G	HT700-4G	H522-4G	H521-6G	Vhs12-224K
Type	FTTB-VDSL	GPON OLT	GPON OMT	GPON OMT	GPON ONU
Speed	100Mbps	4Gbps	2 GPON ports	1 GPON port	1 GPON port
Service	32 GPON ports	4 GPON ports	2 x 40G/2.500M/1GE	1 x 40G/2.500M/1GE	34 VDSL2 ports
Height	18U	18U	18U	18U	18U

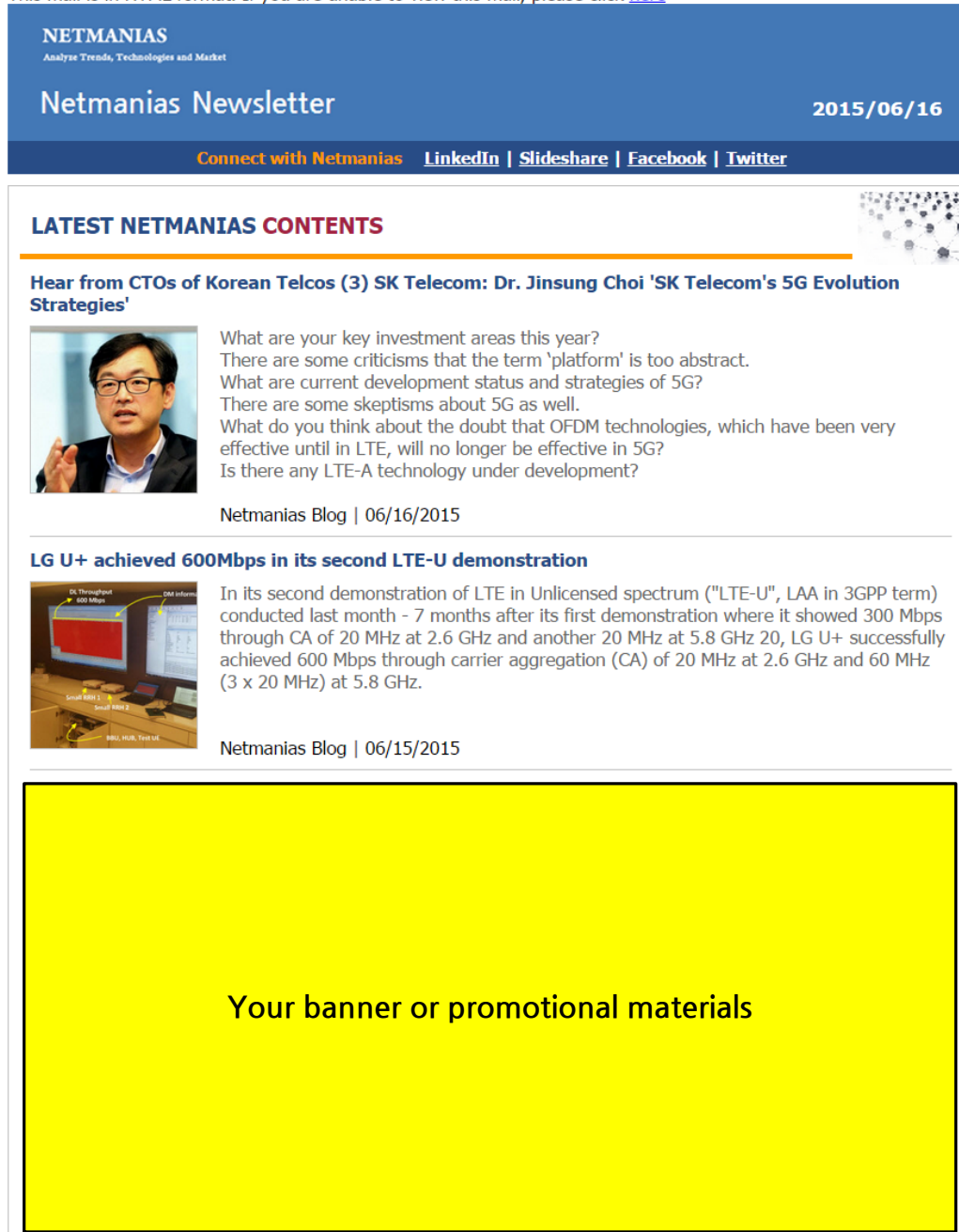
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Netmanias Newsletter

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