Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: Status of the IWPC MoGIG (Mobile Multi Gigabit (MoGIG) Wireless Networks and Terminals) Working Group and industries move to Nanocells

Date Submitted: July 5 2012
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Re: general Contribution

Abstract: Discussion of the newly formed IWPC MoGIG working group who's focus is on the network and equipment aspects of small cell and nanocell millimeter Wave and THz based street level infrastructure. More so how this Industry working group may align its objectives and collaborations with the 802.15 THz IG to insure network and device standards comply with spectrum and 802.15 requirements

Purpose: Support material for 802.15 THz Interest Groups focus and activities

IWPC The International Wireless Industry Consortium™

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About IWPC

- Mission Statement
- Why a Consortium?
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- History
- Staff Bios
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Mission Statement

We facilitate global knowledge-capital collaboration, delivering unfiltered real time insight into vital technology, market and ecosystem evolution. Our technology-neutral Community provides leadership to:

- Identify new markets, products & service opportunities

- Illuminate potential supply chain gaps

- Network with first-hand knowledge experts

 for ALL things wireless.

Our Mission is to organize very specific **Workshops** to meet the needs and interests of the industry, our members, and the Original Systems Specifiers (Carriers, Automakers, Gov't Agencies, etc). These Workshop topics are suggested by our Members and others in the industry.

In addition, we organize and run **Working Groups** to address those topics which need additional and ongoing industry collaboration to reach specific goals and conclusions. These Working Groups are proposed by our Members and/or the Original Systems Specifiers.

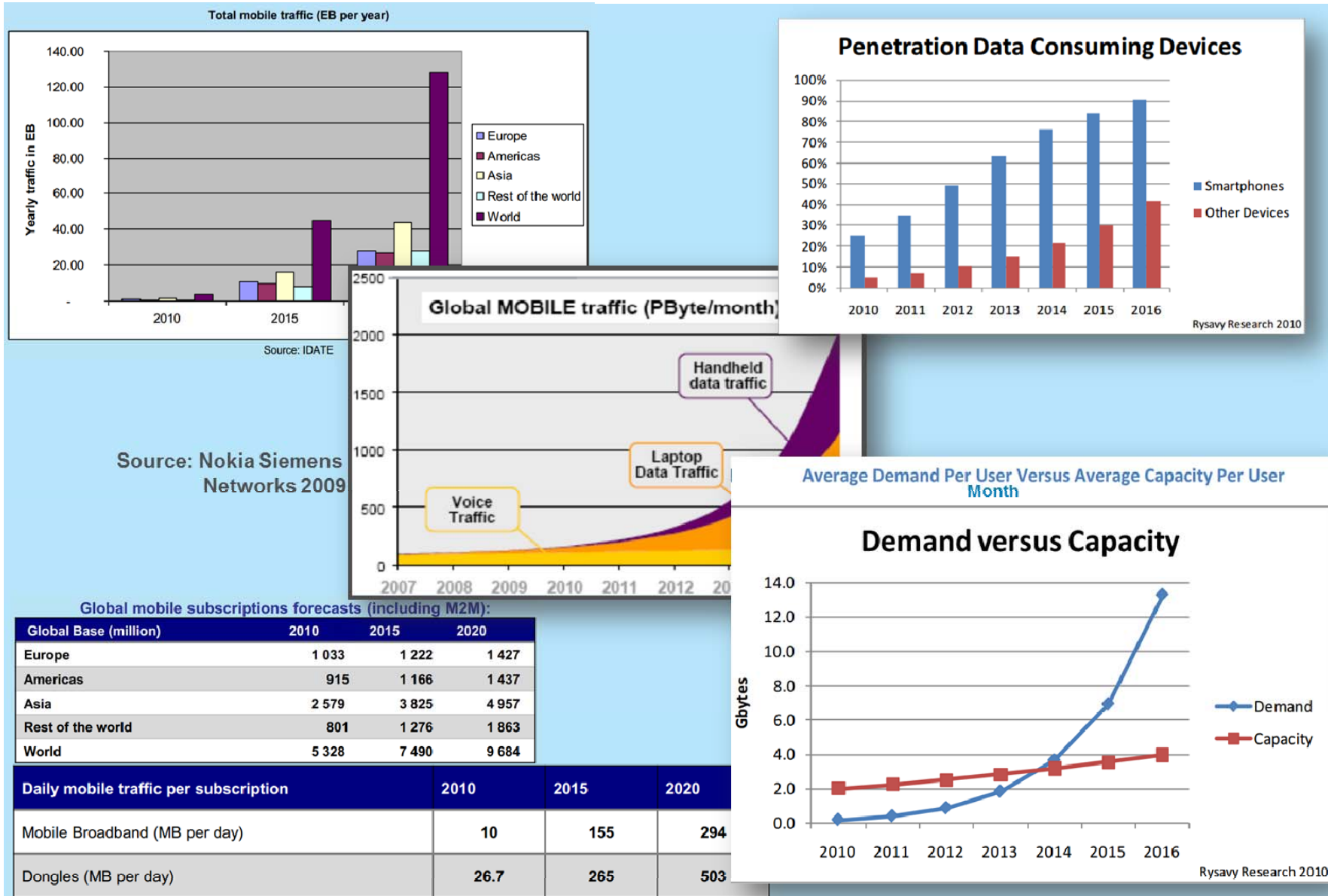# IWPC Industry and Research Community

ALL | IWPC Workshops | IWPC Working Groups

Date	Event	Location
	2012	
Jul 02 - Jul 06	3GPP SA5-Converged Management	Beijing, China
Jul 08 - Jul 14	2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting	Chicago, IL USA
Jul 09 - Jul 13	3GPP SA3#68	Bratislava, Slovakia
Jul 09 - Jul 13	3GPP SA2#92	Barcelona, Spain
Jul 10 - Jul 11	4th Asia Symposium on Quality Electronic Design	Penang, Malaysia
Jul 17	Working Group: Tower Top Electronics Reliability — Description: TTER Working Group Conference Call — Full Details For Members	Start Time: 1:00 PM Stop Time: 2:30 PM EDT (GMT -4 Hrs), USA
Jul 17 - Jul 19	3GPP SA3#46-LI	Quebec City, Quebec, Canada
Jul 17 - Jul 20	5th International Mult-Conference on Engineering and Technology Innovation	Orlando, FL USA
Jul 16 - Jul 18	Hybrid Small Fuel Cells 2012	Boston, MA USA
Jul 19 - Jul 20	Next Generation Batteries - 2012	Boston, MA USA
Jul 22 - Jul 28	The Twentieth Annual International Conference on COMPOSITES/NANO ENGINEERING (ICCE - 20) 2012	Beijing, China
Jul 24 - Jul 29	IEEE ICWS 2012 19th International Conference on Web Services	Honolulu, HA USA
Jul 30 - Aug 03	3GPP SA1#59	Chicago, IL USA
Aug 06 - Aug 08	IEEE EMC 2012 International Symposium on Electromagnetic Compatibility	Pittsburgh, PA USA
Aug 06 - Aug 10	3GPP PCT1#79, 3GPP PCT3#70, 3GPP PCT4#58	Chicago, IL USA
Aug 11 - Aug 12	3GPP SA4#7-Joint SQ / EVS SWG	Chicago, IL USA
Aug 12 - Aug 13	Broadband Traffic Management, Latin America	Rio de Janeior, Brazil
Aug 13 - Aug 16	13th International Conference on Electronic Packaging Technology & High Density Packaging (ICEPT-HDP 2012)	Guilin, China
Aug 13 - Aug 17	3GPP SA4#70	Chicago, IL USA
Aug 13 - Aug 17	3GPP RAN4#64, 3GPP RAN5#56, 3GPP RAN1#70, 3GPP RAN2#79, 3GPP RAN3#77	Qingdao, China
Aug 13 - Aug 16	2012 International Conference on Electronic Packaging Technology	Guilin, China
Aug 14 - May 17	Sviaz Expo Comm Moscow - 2012	Moscow, Russia
Aug 16 - Aug 19	ICETC 2012 International Conference on Education Technology and Computer	Cape Town, South Africa
Aug 19 - Aug 23	PIERS 2012 Progress in Electromagnetics Research Symposium	Moscow, Russia
Aug 20 - Aug 23	3GPP PCT6#65	Helsinki, Finland
Aug 20 - Aug 24	3GPP SA5#84	Berlin, Germany
Aug 21	Working Group: Tower Top Electronics Reliability — Description: TTER Working Group Conference Call — Full Details For Members	Start Time: 1:00 PM Stop Time: 2:30 PM EDT (GMT -4 Hrs), USA
Aug 27 - Aug 31	3GPP GERAN#55	Vienna, Austria
Aug 27 - Aug 31	8th IWCMC - International Wireless Communications and Mobile Computing	Cyprus,
Aug 28 - Aug 31	ISWCS 2012 - 9th International Symposium on Wireless Communication Systems	Paris, France
Aug 28 - Aug 28	IWSON 2012 - 2nd International Workshop on Self-Organizing Networks	Paris, France
Aug 28 - Aug 30	3GPP GERAN1#55 , 3GPP GERAN2#55 , 3GPP GERAN3new#55	Vienna, Austria
Sep 03 - Sep 03	Labor Day	USA
Sep 03 - Sep 06	2012 IEEE 76th Vehicular Technology Conference: VTC2012-Fall	Quebec City, Canada
Sep 04 - Sep 07	3GPP RAN#57	Chicago, IL USA
Sep 05 - Sep 07	3GPP PCT#57	Control Room?
Sep 09 - Sep 12	PIMRC 2012 - 23rd Annual International Symposium on Personal, Indoor and Mobile Radio Communications	Sydney, Australia
Sep 09 - Sep 13	45th International Symposium on Microelectronics	San Diego, CA USA
Sep 10 - Sep 12	3GPP SA#57	Chicago, IL USA
Sep 11 - Sep 12	WIFI World Summit	Barcelona, Spain
Sep 12 - Sep 13	SDP Global Summit 2012	Rome, Italy
Sep 17 - Sep 20	ESTC - 2012, 4th Electronics System Integration Technologies Conference	Amsterdam, The Netherlands
Sep 17 - Sep 20	2012 IEEE International Conference on Ultra-Wideband	Syracuse, NY USA
Sep 17 - Sep 17	Asia Broadband Traffic Management	Singapore
Sep 17 - Sep 19	PMR Summit 2012	Barcelona, Spain
Sep 17 - Sep 20	Carrier Ethernet World Congress 2012	Barcelona, Spain
Sep 18	Working Group: Tower Top Electronics Reliability — Description: TTER Working Group Conference Call — Full Details For Members	Start Time: 1:00 PM Stop Time: 2:30 PM EDT (GMT -4 Hrs), USA
Sep 18 - Sep 19	Antenna Systems 2012	Denver, CO USA
Sep 18 - Sep 20	IEEE MTT-S International Microwave Workshop Series on Millimeter Wave Wireless Technology and Applications (IMWS 2012)	Nanjing, China
Sep 18 - Sep 19	7th Annual LTE Asia - 2012	Singapore
Sep 18 - Sep 19	Symposium Asia 2012	Singapore
Sep 18 - Sep 22	P & T 2012 - The 21st PT/Expo Comm China	Beijing, China

Date	Event	Location
Sep 19 - Sep 21	**Upcoming IWPC Workshop — Very High Capacity Networks** — Flexible Capacity for Stadiums, Public Venues, Music Festivals and Campuses — Hosted By: U.S. Cellular — Tour Info: TBC	Chicago, IL USA
Sep 19 - Sep 21	WMNC 2012 - 5th Joint IFIP Wireless and Mobile Networking Conference	Bratislava, Slovakia
Sep 21 - Sep 23	WICOM 2012 - International Conference on Wireless Communication, Networking and Mobile Computing	Shanghai, China
Sep 23 - Sep 28	37th IRMMW-THz @ Wollongong - International Conference on Infrared, Terahertz and Millimeter Waves	Wollongong, Australia
Sep 23 - Sep 25	Telecoms CEM Congress Middle East 2012	Dubai, UAE
Sep 23 - Sep 27	2012 FTTH Conference & Expo	Dallas, TX USA
Sep 24 - Sep 27	Mobile Broadband World	London, United Kingdom
Sep 24 - Sep 27	3GPP SA4-MBS SWG on IS-DASH	Rennes, France
Sep 25 - Sep 28	3GPP RAN5#56-BIS	Seoul, Korea
Sep 25 - Sep 27	HetNet: The Base Station Conference	Bristol, United Kingdom
Sep 25 - Sep 27	PCB West 2012	Santa Clara, Ca USA
Sep 25 - Sep 27	2nd MBT User Conference	Tallinn, Estonia
Sep 25 - Sep 27	APNOMS 2012 - 14th Asias - Pacific Network Operations & Management Symposium	Seoul, Korea
Sep 26 - Sep 28	ICSSC 2012 : International Conference on Satellite and Space Communications	Rome, Italy
Sep 27 - Sep 28	4th International EURASIP Worshop on RFID Technology	Torino, Italy
Oct 01 - Oct 03	Packet Microwave & Backhaul Forum	London, United Kingdom
Oct 01 - Oct 03	2012 Wireless Infrastructure Show	Orlando, FL USA
Oct 02 - Oct 02	3GPP RAN5-ss vendors/TT160#19	Sophia Antipolis, France
Oct 02 - Oct 04	4th Annual CDN World Summit 2012	London, United Kingdom
Oct 03 - Oct 04	3rd annual Self Organising Networks	Cannes, France
Oct 08 - Oct 08	Columbus Day	USA
Oct 08 - Oct 10	Telecom Cloud Services Asia	Hong Kong
Oct 08 - Oct 12	3GPP RAN1#70-BIS	San Diego, CA USA
Oct 08 - Oct 12	3GPP RAN3#77-BIS	Lecce, Italy
Oct 08 - Oct 12	3GPP RAN2#79-BIS	Bratislava, Slovakia
Oct 08 - Oct 12	3GPP RAN4#64-BIS	Santa Rosa, CA USA
Oct 08 - Oct 12	3GPP SA5#85	Kyoto, Japan
Oct 08 - Oct 12	3GPP SA2#93	Sofia, Bulgaria
Oct 09 - Oct 11	CTIA - Enterprise & Applications	San Diego, Ca USA
Oct 09 - Oct 10	Connected Home Americas 2012	Atlanta, Ga USA
Oct 10 - Oct 10	M2M Zone at CTIA Enterprise & Applications	San Diego, CA USA
Oct 10 - Oct 10	M2M Conference at CTIA	San Diego, CA USA
Oct 10 - Oct 12	Transport Network Strategies 2012	Amsterdam, The Netherlands
Oct 10 - Oct 12	ATC/REV 2012 The International Conference on Advanced Technologies for Communications	Hanoi, Vietnam
Oct 11 - Oct 13	HEALTHCOM 2012 - 14th International IEEE Conference on e-Health Networking, Application and Services	Beijing, China
Oct 15 - Oct 17	**Upcoming IWPC Workshop — Next Generation Wireless Infrastructure Reliability for Macro & Small Cells** — Active Antennas, Remote Radio Heads, Equipment Telemetry, SON, PIM, Installation Best Practices, Lightning Mgmt, Reliability Prediction, Cables/Connectorization, Power Amplifiers, Linearization — Hosted By: AT&T — Additional Info: (+ TTER Working Group Findings)	Atlanta, GA USA
Oct 15 - Oct 19	3GPP CT1#80 , 3GPP CT4#58-BIS , 3GPP CT3#70-BIS CANCELLED	Prague, Czech Republic
Oct 16 - Oct 18	Broadband World Forum 2012	Amsterdam, The Netherlands
Oct 16 - Oct 19	3GPP CT6#66	Prague, Czech Republic
Oct 16 - Oct 18	3GPP SA3#47-LI	USA
Oct 16 - Oct 17	MVNOs Industry Summit ASIA 2012	Kuala Lumpar, Malaysia
Oct 22 - Oct 24	SDN & Openflow World Congress	Frankfurt, Germany
Oct 22 - Oct 24	GSMA - NFC & Mobile Money Summit	Milan, Italy
Oct 22 - Oct 24	CNSM 2012 - 8th International Conference on Netowrk and Service Management	Las Vegas, NV USA
Oct 23 - Oct 24	Verizon Communications18th annual NEBS Conference	Las Vegas, NV USA
Oct 24 - Oct 24	3GPP PCG#29	North America, USA
Oct 24 - Oct 25	3rd ETSI TC M2M Workshop	Sophia Antipolis, France
Oct 24 - Oct 26	TelcoTV - 2012 - 11th Annual Conference & Expo	Las Vegas, NV USA
Oct 25 - Nov 02	EuMW 2012 European Microwave Week	Amsterdam, The Netherlands
Oct 25 - Oct 25	3GPP POP#28	North america, USA
Oct 26 - Oct 26	10th annual Texas Wireless Summit - 2012	Austin, TX USA
Oct 29 - Nov 02	2012 International Symposium on Antennas and Propagation (ISAP2012)	Nagoya, Japan
Oct 29 - Nov 01	4G World 2012	Chicago, IL USA
Oct 29 - Oct 31	ICICS 2012 - International Conference on Information and Communications Security	Hong Kong
Oct 30 - Oct 31	2nd Annual Small Cells Global Congress	Berlin, Germany

Date	Event	Location
Nov 05 - Nov 07	**Upcoming IWPC Workshop — Tunable Components & Platform Architectures for Smartphones** — Defining Requirements to Effectively Implement Tunable RF Systems — Hosted By: RIM	Toronto, ON Canada
Nov 05 - Nov 09	3GPP SA#58	Edinburgh, Scotland
Nov 05 - Nov 08	12th International Conference on ITS Telecommunications (ITST 2012)	Taipei, Taiwan
Nov 06 - Nov 08	Global Broadband Traffic Management	London, United Kingdom
Nov 06 - Nov 08	ITSF 2012 - Time and Sync in Telecoms	Nice, France
Nov 06 - Nov 07	RichCommunication 2012	Berlin, Germany
Nov 07 - Nov 09	Fifth International Conference on the Applications of Digital Information and Web Technologies (ICADIWT 2012)	Nicosia, Cyprus
Nov 07 - Nov 09	4th IEEE LATINCOM 2012 Latin-American Conference on Communications 2012	Cuenca, Ecudor
Nov 08 - Nov 09	**Upcoming IWPC Workshop — Innovative Technologies, Tools & Services to Drive Smartphone Performance & Customer Loyalty** — Hosted By: Telus	Toronto, ON Canada
Nov 08 - Nov 09	Municipal Fiber Networks - 2012	Danville, VA USA
Nov 12 - Nov 14	Spectrum Management Service	Munich, Germany
Nov 12 - Nov 16	3GPP SA4#71	Bratislava, Slovakia
Nov 12 - Nov 16	3GPP RAN5#57	Baltimore, MD USA
Nov 12 - Nov 16	3GPP RAN4#65 , 3GPP RAN2#80 , 3GPP RAN3#78 , 3GPP RAN1#71, 3GPP SA2#94 ,3GPP CT3#71 , 3GPP SA5#86, 3GPP CT4#59, 3GPP PCT1#81	New Orleans, LA USA
Nov 12 - Nov 16	3GPP SA1#60	Edinburgh, Scotland
Nov 12 - Nov 16	IPv6 Transition Test Event	Beijing, China
Nov 13 - Nov 14	20th Annual Mobile/Roaming World Summit 2012	London, United Kingdom
Nov 13 - Nov 16	3GPP CT6#67	New Orleans, LA USA
Nov 14 - Nov 15	LTE North America - 2012	Dallas, TX USA
Nov 14 - Nov 15	4G Latin America Conference & Expo	Bogota, Colombia
Nov 14 - Nov 15	MVNOs Industry Summit USA 2012	Dallas, TX USA
Nov 19 - Nov 21	MVNO Networking Congress	Paris, France
Nov 19 - Nov 30	3GPP GERAN#56	Prague, Czech Republic
Nov 20 - Nov 21	MNO - Mobile Network Optimisation	Amsterdam, The Netherlands
Nov 20 - Nov 23	3GPP GERAN1#56 , 3GPP GERAN2#56	Prague, Czech
Nov 22 - Nov 22	Thanksgiving Day	USA
Nov 26 - Nov 30	NGN Delivery Solutions with Network Automation, Serivice Assurance & Optimisation 2012	London, United Kingdom
Nov 27 - Nov 28	LTE - Backhaul Summit - 2012	Amsterdam City, Netherlands
Nov 28 - Nov 29	CEM Global Summit	Madrid, Spain
Dec 03 - Dec 07	IEEE - Globecom 2012	Anaheim, CA USA
Dec 03 - Dec 06	LTE/EPC & Converged Mobile Backhaul	London, United Kingdom
Dec 03 - Dec 05	Carrier Ethernet APAC 2012	hong Kong
Dec 04 - Dec 07	3GPP RAN#58	Barcelona, Spain
Dec 04 - Dec 07	Middle East Telco World Summit	Dubai, UAE
Dec 04 - Dec 07	3GPP PCT#58	Barcelona, Spain
Dec 05 - Dec 06	Small Cells in americas 2012	San diego, Ca USA
Dec 05 - Dec 07	EPTC 2012 - 14th Electronics Packaging Technology Conference	Singapore
Dec 06 - Dec 07	Annual Battery Safety 2012	Las Vegas, NV USA
Dec 06 - Dec 08	APSCC 2012 - IEEE Asia-Pacific Services Computing Conference	Guillin, China
Dec 10 - Dec 12	3GPP SA#58	Barcelona, Spain
Dec 10 - Dec 12	Control Room Communications 2012	Copenhagen, Denmark
Dec 12 - Dec 14	ICSPCS 2012 - 6th International Conference on Signal Processing and Communication Systems	Gold Coast, Australia
Dec 12 - Dec 13	IEEE IMSAA 2012 - 5th International Conference on Internet Multimedia Systems Architecture and Applications	Bangalore, India
Dec 13 - Dec 15	India Telecom 2012 7th International Exhibition & Conference	New Delhi, India
Dec 25 - Dec 25	Christmas Day	N/A
Dec 31 - Dec 31	New Years Eve	N/A

So what the heck is MoGIG?

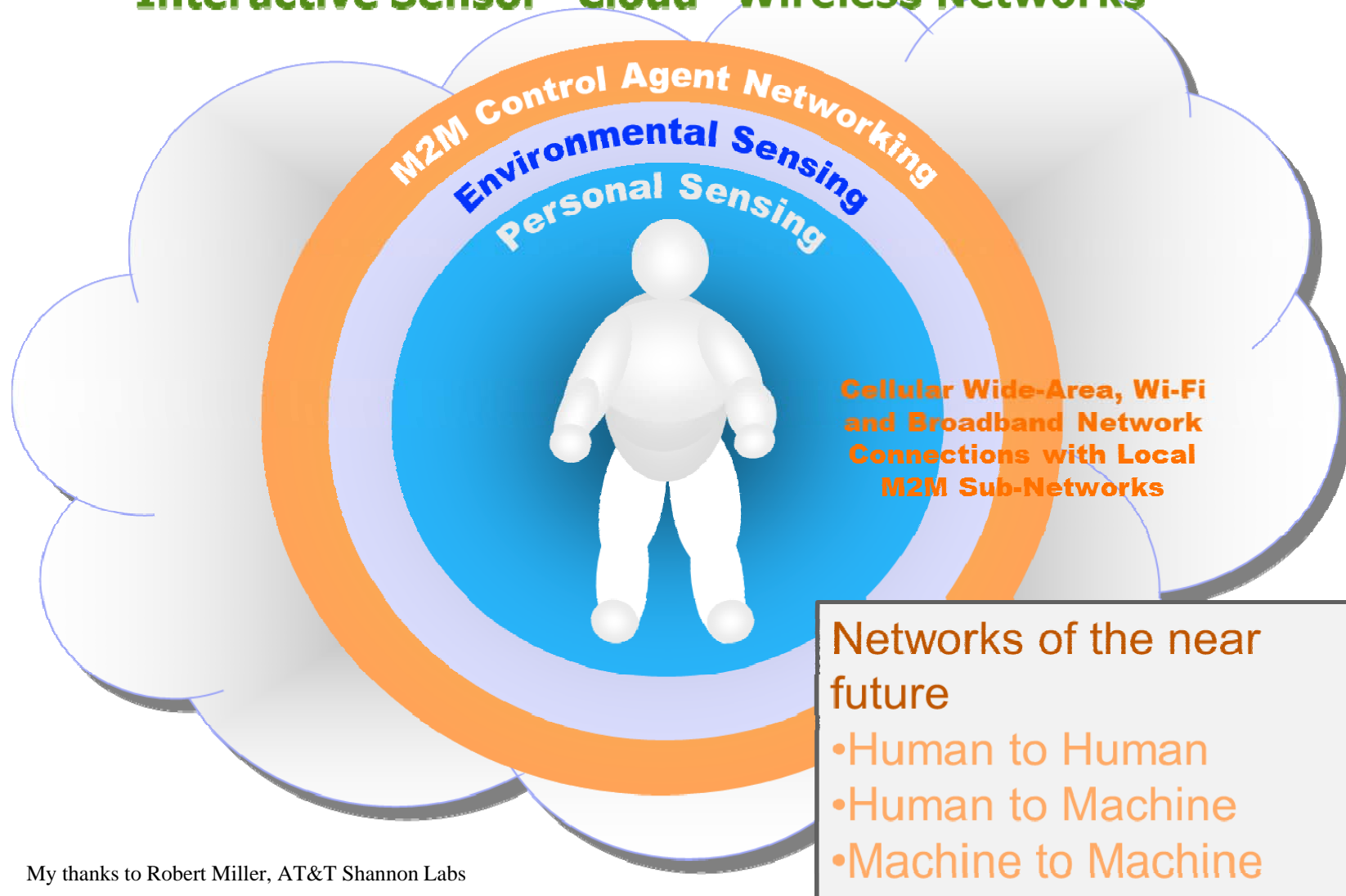To date MoGIG WG has 60 members from Industry and science

IWPC
Mobile Multi Gigabit Wireless Networks and Terminals (MoGIG) Working Group
Formation of MoGIG Working Group
Dec 2011

Our focus and goal is to;

Conceive, design and demonstrate a multi-gigabit mobile broadband wireless nanocell as an extension beyond Small Cell and HetNet based Phy layer platforms. Nanocells will be capable of transporting, routing and delivering "big data" wirelessly at 10+Gbps
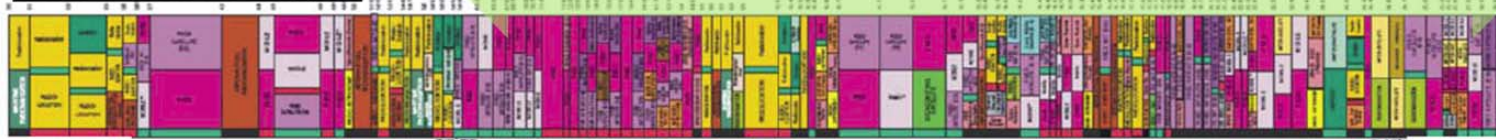
Total mobile traffic (EB per year)

Yearly traffic in EB

- Europe
- Americas
- Asia
- Rest of the world
- World

2010   2015

Source: IDATE

Penetration Data Consuming Devices

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

2010 2011 2012 2013 2014 2015 2016

- Smartphones
- Other Devices

Rysavy Research 2010

Global MOBILE traffic (PByte/month)

2500
2000
1500
1000
500
0

Handheld data traffic

Laptop Data Traffic

Voice Traffic

2007 2008 2009 2010 2011 2012

Source: Nokia Siemens Networks 2009

Average Demand Per User Versus Average Capacity Per User Month

Demand versus Capacity

14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0

Gbytes

2010 2011 2012 2013 2014 2015 2016

- Demand
- Capacity

Rysavy Research 2010

Global mobile subscriptions forecasts (including M2M):

Global Base (million)	2010	2015	2020
Europe	1 033	1 222	1 427
Americas	915	1 166	1 437
Asia	2 579	3 825	4 957
Rest of the world	801	1 276	1 863
World	5 328	7 490	9 684

Daily mobile traffic per subscription	2010	2015	2020
Mobile Broadband (MB per day)	10	155	294
Dongles (MB per day)	26.7	265	503

Envisioning Multi Layered Communications and Interactive Sensor "Cloud" Wireless Networks

M2M Control Agent Networking

Environmental Sensing

Personal Sensing

Cellular Wide-Area, Wi-Fi and Broadband Network Connections with Local M2M Sub-Networks

Networks of the near future
- Human to Human
- Human to Machine
- Machine to Machine

My thanks to Robert Miller, AT&T Shannon Labs

MILLIMETER WAVE TERAHERTZ

Microwave range?

3 GHz

30 GHz

mm-wave range?

30 GHz   US frequency allocations, Oct 2003

300 GHz

So where's the spectrum

- Huge spectrum resources above 300GHz – largely untapped
- 200GHz of spectrum (Fixed and Mobile) between 10GHz – 300GHz, and above 100Ghz currently no allocation
- 50GHz of spectrum (Fixed and Mobile) between 20GHz and100GHz
- 200GHz worth of THz spectrum 300-600GHz
- Of this spectrum what bands overlap in global market for new generation of data and M2M mobile wireless super channels

262.0   265.0   275.0   300.0

RADIO-NAVIGATION SATELLITE	RADIO-ASTRONOMY	MOBILE
RADIO-NAVIGATION	FIXED SATELLITE (E-S)	
MOBILE SATELLITE	MOBILE	FIXED
MOBILE	FIXED	

THz

300 GHz
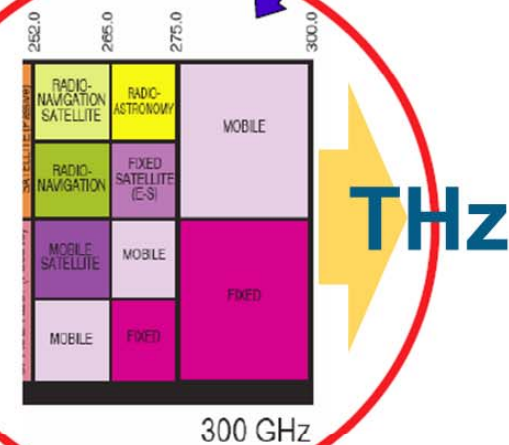
My thanks to Dr. Thomas Kuerner, Technische Universität Braunschweig

The First Steps ... Small Cell street level cell phone connectivity with 60+GHz backhaul

Shaped Wireless LANs
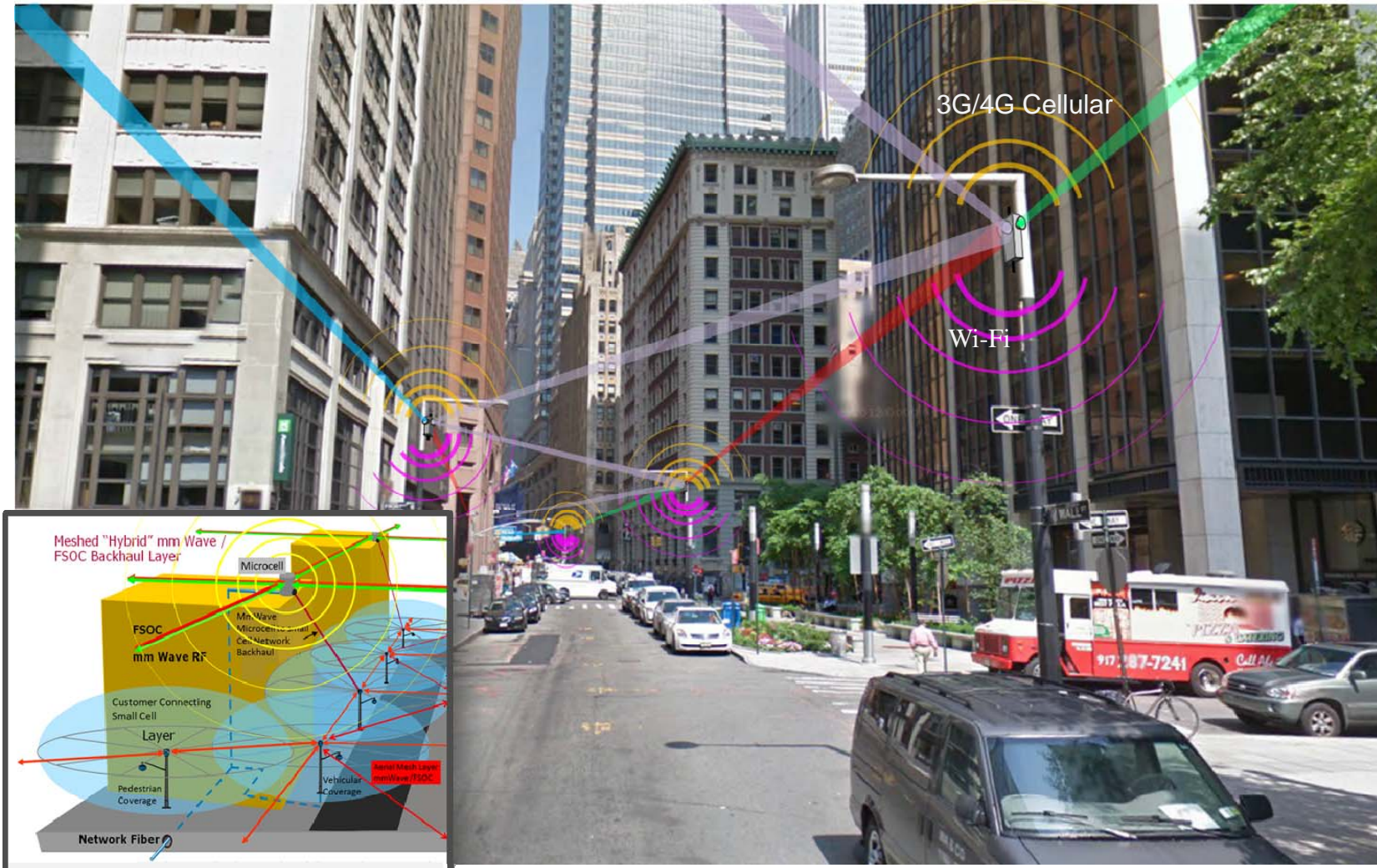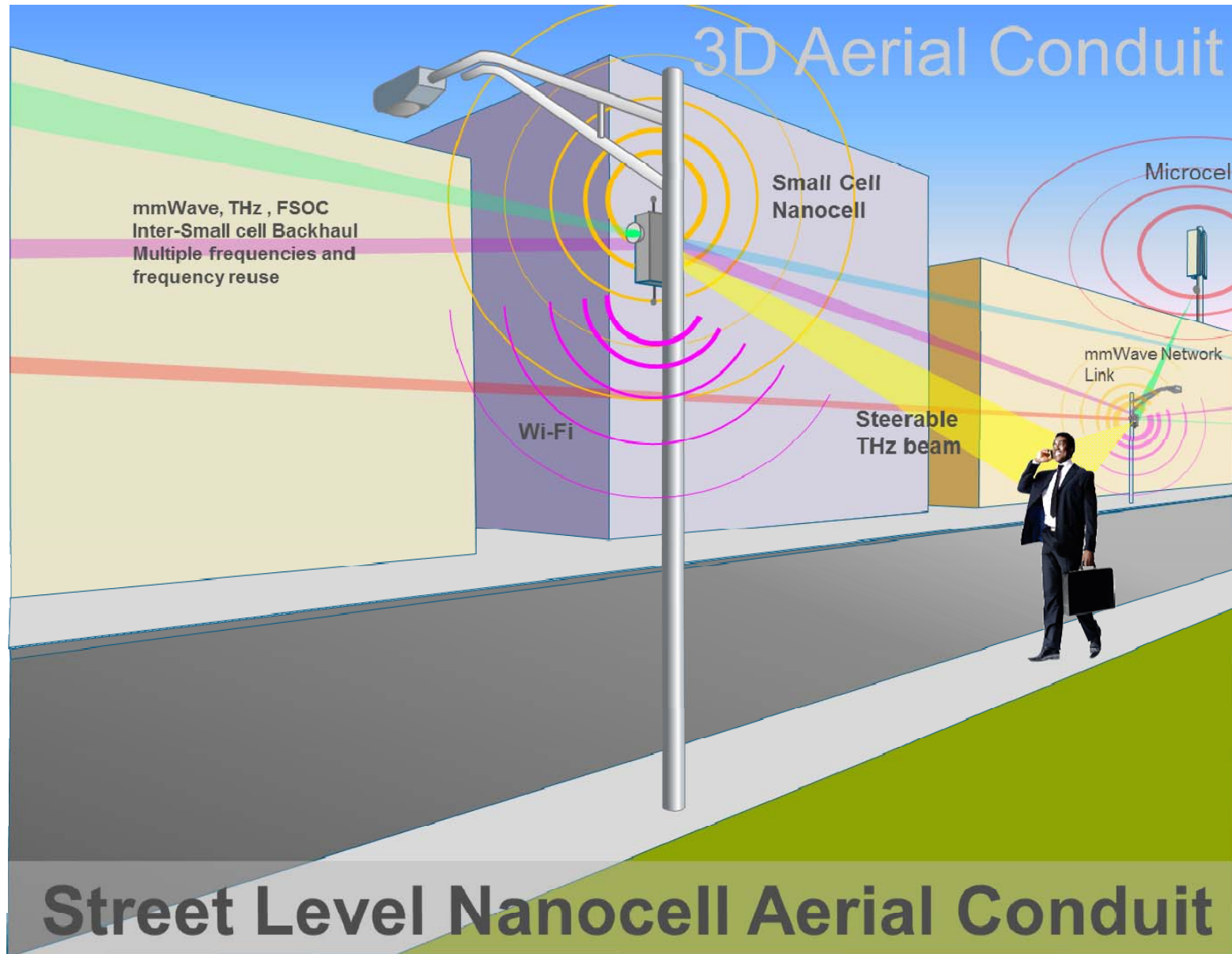
The Solution... Nanocell street level smartdevice connectivity with 60-600GHz backhaul and directional beams
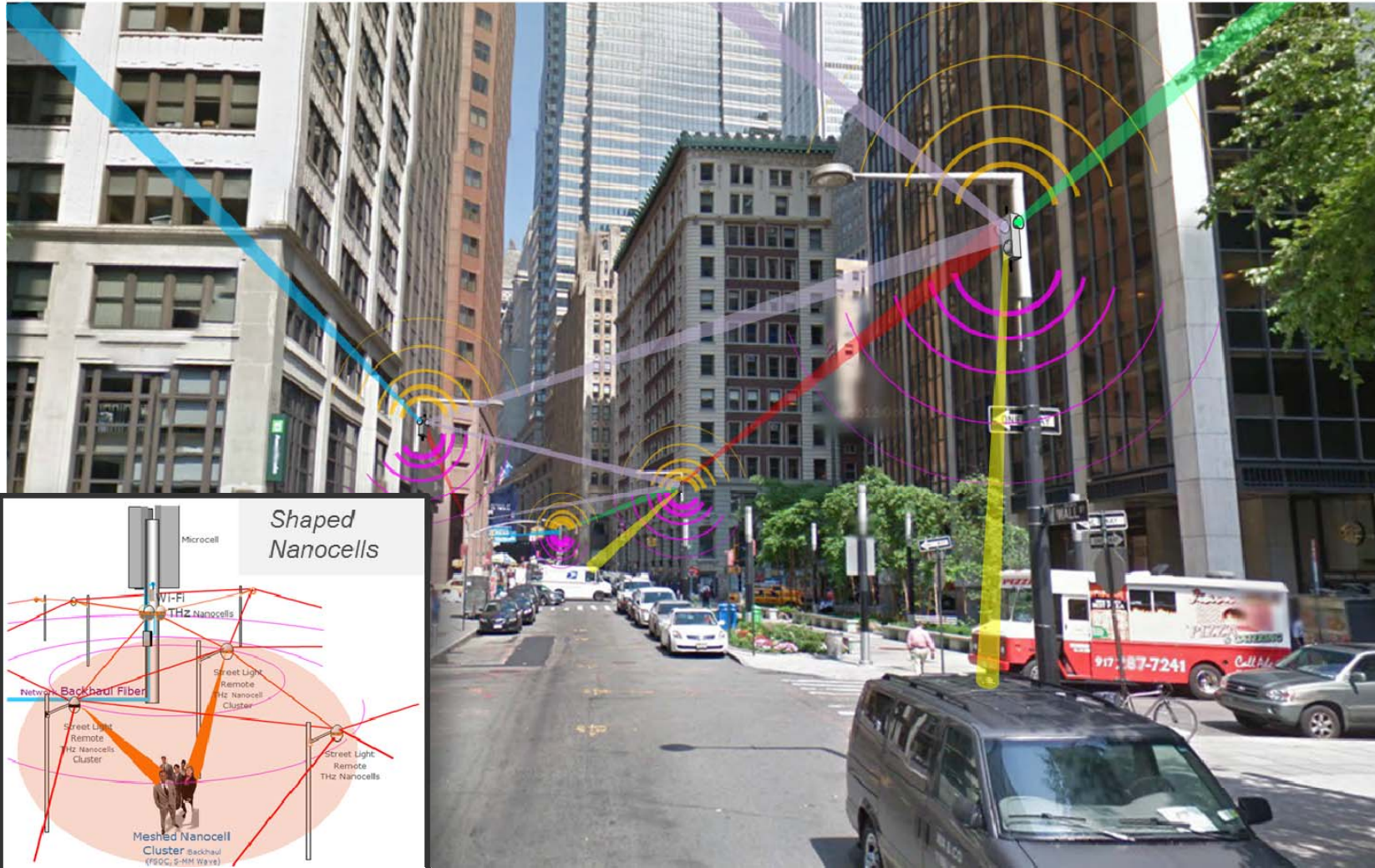
MoGIG Committee Focus

1. **State of the Art Review**
   Chair: Dr. Lothar Moeller, Alcatel Lucent

2. **Use Cases Study Group**
   Chairs:
   Dave Britz, AT&T
   Dr. Thomas Kuerner, Technische Universität, Braunschweig

3. **Network Architecture Options Study Group**
   Chairs:
   Dr. Philip Pietraski, InterDigital Communications
   Gregg Charlton, InterDigital Communications
   Dave Britz, AT&T

4. **Channel Modeling Study Group**
   Chairs:
   Dr. Wilhelm Keusgen, Fraunhofer Inst.
   Michael Peter, Fraunhofer Inst.

5. **Physical Layer Study Group**
   Chairs:
   Dr. Wilhelm Keusgen, Fraunhofer Inst.
   Sebastian Priebe, Technische Universität Braunschweig

6. **Global Spectrum availability and harmonization Study Group**
   Chair: Dave Britz, AT&T

7. **RF Front End Technologies – Antennas Study Group**
   Need chair

8. **RF Front End Technologies – Transceivers Study Group**
   Need chair

9. **RF Front End Technologies – Semiconductors Study Group**
   Chair: Dr. Steven Sarkozy, Northrop Grumman

10. **Demonstrator realization Study Group**
    Chairs:
    Steve Wilkus, Alcatel Lucent
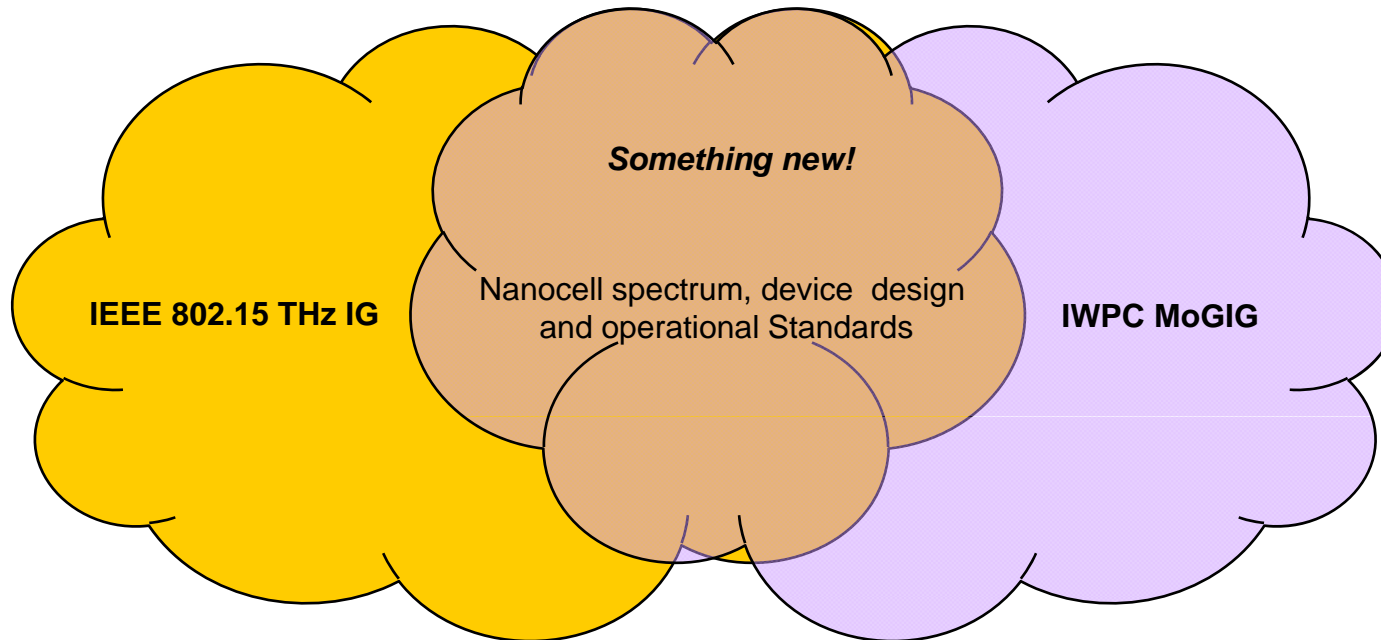   Dr. John Federici, NJIT
    Dr. Steven Sarkozy, Northrop Grumman

MoGIG Organizational Status

MoGIG Working Group Formation

Dec 2011

MoGIG Working Group Statement of Work Document Release

April 2012

MoGIG Working Group Committee Chair Selection

April 2012

MoGIG Working Group Process and Procedures Document Release

July 2012

MoGIG Working Group Committee Activation

July 2012

Advisory Team:

Robert R Miller, AT&T Labs Shannon Laboratories
Dr. Thomas Kuerner, Technische Universität Braunschweig
Sebastian Priebe, Technische Universität Braunschweig
Dr. Philip Pietraski, InterDigital Communications
Dr. Hossam H'MIMY, Ericsson Inc
Dr. Michael Marcus, Marcus Spectrum Solutions LLC
Doug Lockie
Stephen Wilkus, Alcatel Lucent
Dr. Lothar Moeller, Alcatel Lucent
Dr. Steven Sarkozy, Northrop Grumman
Dr. John Federici, NJIT
Dr. Wilhelm Keusgen, Fraunhofer Inst.

Work package	1st year	2nd year	3rd year	4th year	5th year	6th year +beyond
1: White Paper	X					
2a: Phy, Mac		X	X			
2b: Spectrum allocation		X	X			
3: Infrastructure and architecture		X	X	X		
4a: Demonstrator		X	X	X	X	
4b: Field trial						X

*Inter-organizationa*l collaboration?

Sharing of focus and technical expertize for a common goal

Something new!

IEEE 802.15 THz IG

Nanocell spectrum, device design
and operational Standards

IWPC MoGIG

How do we do it, what are the questions we haven't asked???