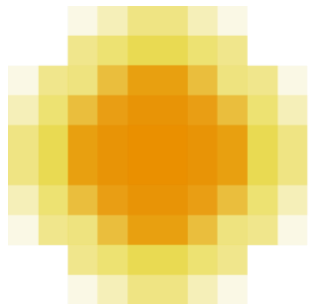




ITU REGIONAL RADIOCOMMUNICATION SEMINAR FOR AMERICAS 2014

Research Issues in IMT Future Bands



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Outline

- Future IMT from Research point of view
- Future bands Scenario
- General comments
- Conclusions

Future bands Scenario

- Research Publications
- 3.5GHz band
- 28GHz band (Near 30 research papers mention mm Wave bands like 28GHz)

Future IMT from Research point of view

- COST Actions (IC1004)
- 5GNOW
- METIS
- Wireless World Research Forum

Research Results



Deliverable D1.2

Initial channel models based on measurements

Project Number:	ICT-317669
Project Name:	Mobile and wireless communications Enablers for the Twenty-twenty Information Society

April 30, 2014

Some recent papers

IEEE Access
practical innovations : open solutions

Millimeter Wave Mobile Communications for 5G Cellular: It Will Work!

THEODORE S. RAPPAPORT¹, SHU SUN¹, RIMMA MAYZUS¹, HANG ZHAO¹, YANIV AZAR¹, KEVIN WANG¹, GEORGE N. WONG¹, JOCELYN K. SCHULZ¹, MATHEW SAMIMI¹, AND FELIX GUTIERREZ¹

¹NYU WIRELESS, Polytechnic Institute of New York University, New York, NY 11201, USA

TD(14)10065	Propagation and MIMO channel capacity predictions for indoor office environment using point cloud room model	Usman Tahir Virk, AALTO Jean-Frederic Wagen, HES-SO
TD(14)10072	Path Loss Models in New York City at 28 GHz and 73 GHz	George R. MacCartney Jr., NYU Wireless Mathew K. Samimi, NYU Wireless Theodore S. Rappaport, NYU Wireless Tommi Jämsä, ANITE
TD(14)10073	Harmonization of 5G path loss models	Tommi Jämsä, ANITE Theodore S. Rappaport, NYU Wireless

3.5GHz

Some recent papers

IEEE ICC 2013 - Wireless Communications Symposium

28 GHz Propagation Measurements for Outdoor Cellular Communications Using Steerable Beam Antennas in New York City

Yaniv Azar, George N. Wong, Kevin Wang, Rimma Mayzus, Jocelyn K. Schulz, Hang Zhao,
Felix Gutierrez, Jr., DuckDong Hwang, Theodore S. Rappaport

NYU WIRELESS

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Recent Papers



February 2014, Vol. 52, No. 2

Network Densification: The Dominant Theme for Wireless Evolution into 5G

Naga Bhushan, Junyi Li, Durga Malladi, Rob Gilmore, Dean Brenner, Aleksandar Damnjanovic, Ravi Teja Sukhavasi, Chirag Patel, and Stefan Geirhofer, Qualcomm Technologies, Incorporated

Five Disruptive Technology Directions for 5G

Federico Boccardi, Vodafone

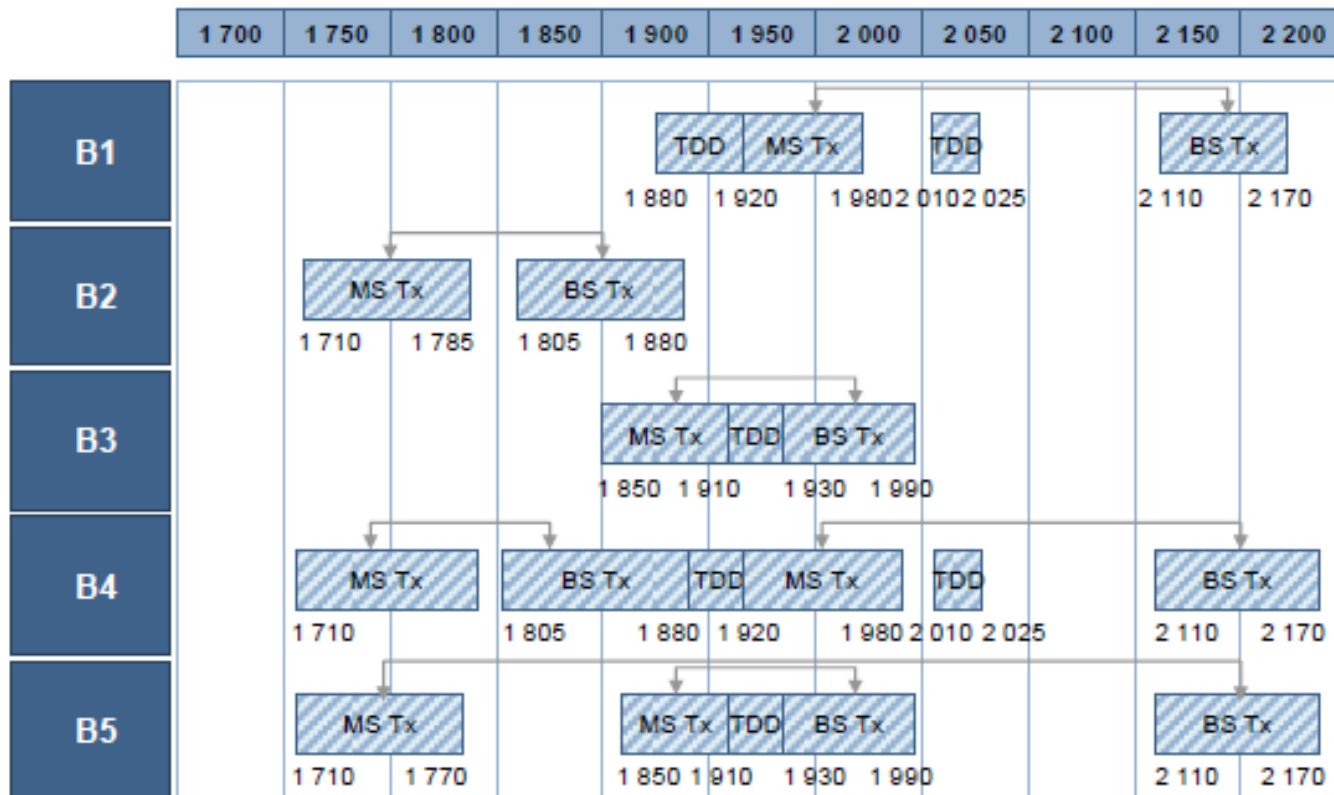
Robert W. Heath Jr., University of Texas at Austin

Angel Lozano, Universitat Pompeu Fabra

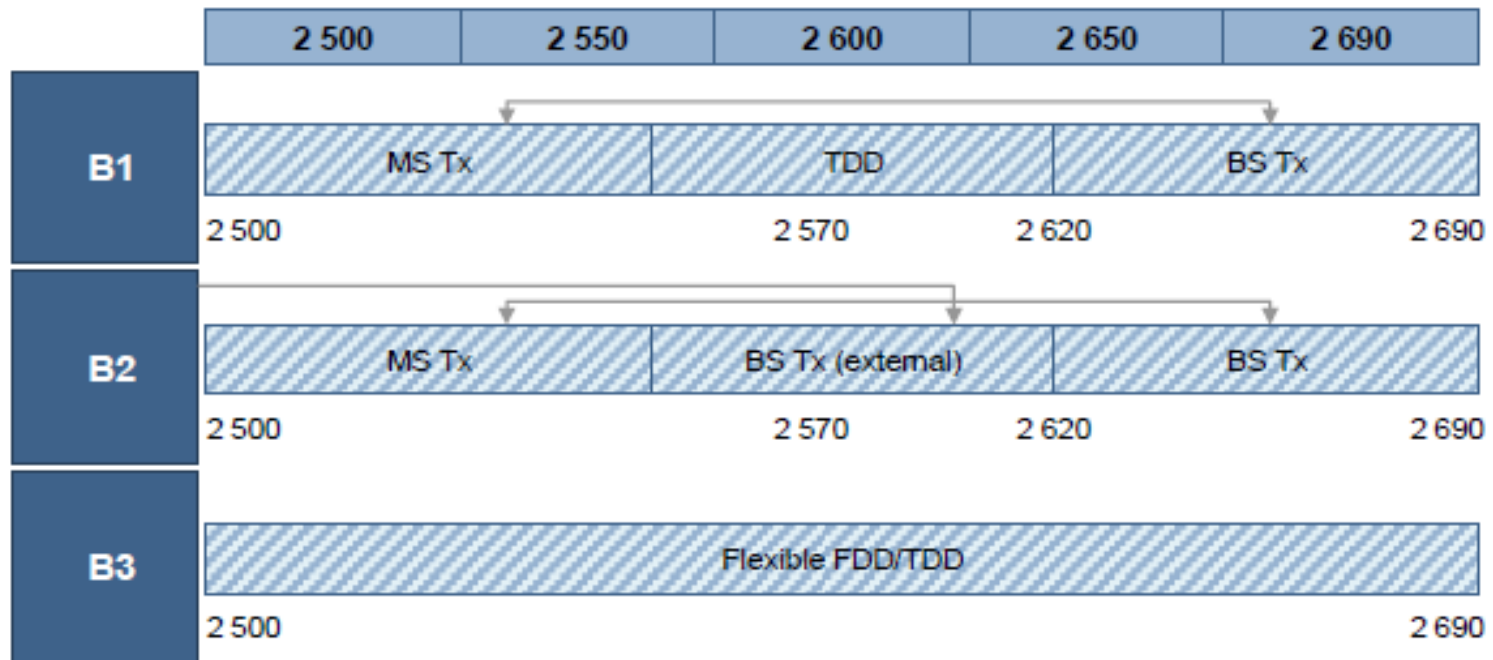
Thomas L. Marzetta, Bell Labs, Alcatel-Lucent

Petar Popovski, Aalborg University

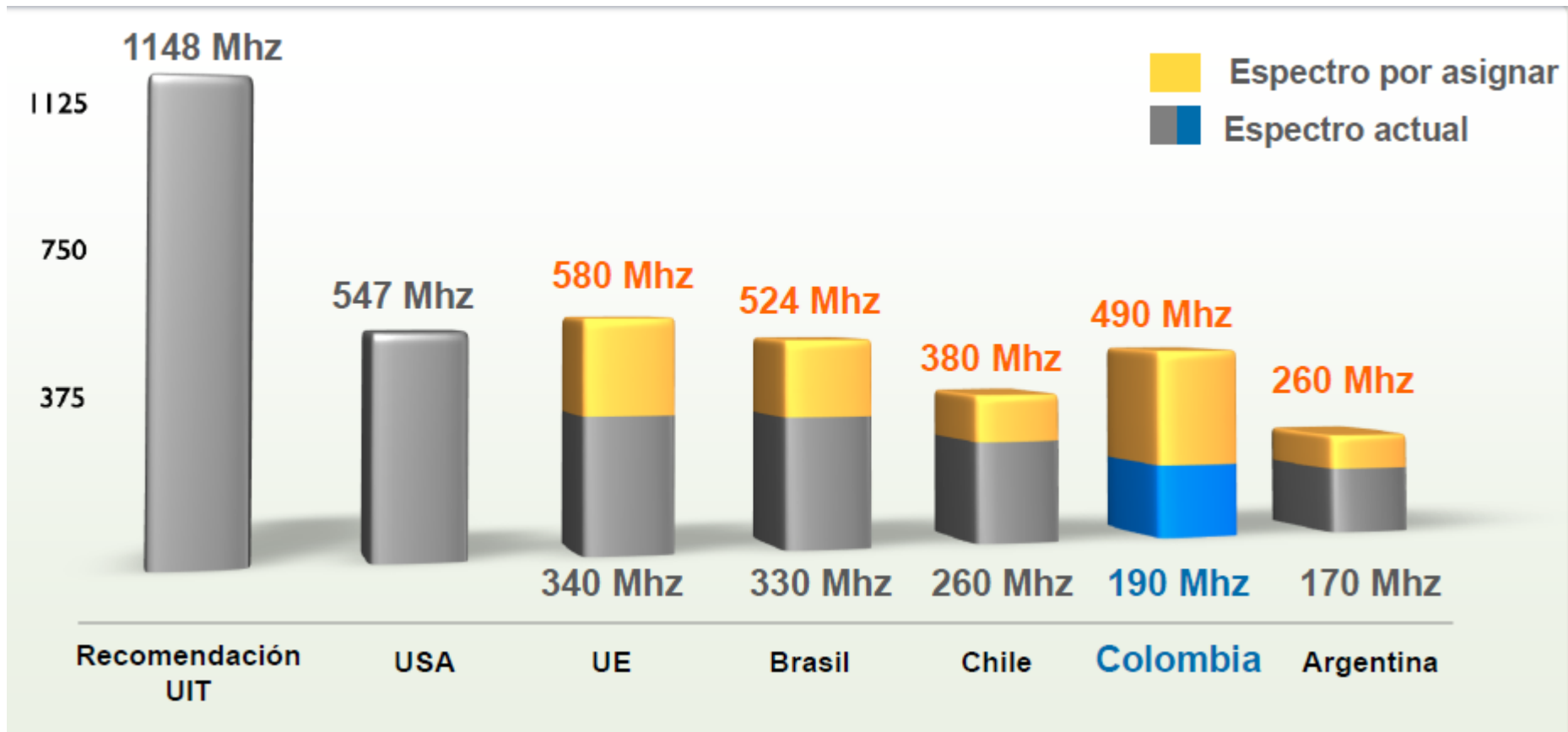
IMT Chanelization



IMT Chanelization

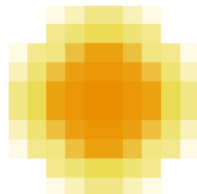


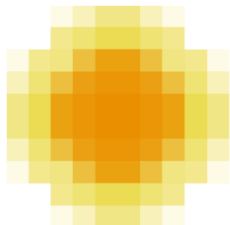
Attributed Spectrum



3.5GHz band

3400-3600 FIJO FIJO POR SATÉLITE (espacio-Tierra) Móvil 5.430A Radiolocalización	3400-3500 FIJO FIJO POR SATÉLITE (espacio-Tierra) Aficionado Móvil 5.431A Radiolocalización 5.433 5.282	3400-3500 FIJO FIJO POR SATÉLITE (espacio-Tierra) Aficionado Móvil 5.432B Radiolocalización 5.433 5.282 5.432 5.432A
3600-4200 FIJO FIJO POR SATÉLITE (espacio-Tierra) Móvil	3500-3700 FIJO FIJO POR SATÉLITE (espacio-Tierra) MÓVIL salvo móvil aeronáutico Radiolocalización 5.433	3500-3600 FIJO FIJO POR SATÉLITE (espacio-Tierra) MÓVIL salvo móvil aeronáutico 5.433A Radiolocalización 5.433
	3700-4200 FIJO FIJO POR SATÉLITE (espacio-Tierra) MÓVIL salvo móvil aeronáutico	3600-3700 FIJO FIJO POR SATÉLITE (espacio-Tierra) MÓVIL salvo móvil aeronáutico Radiolocalización 5.435

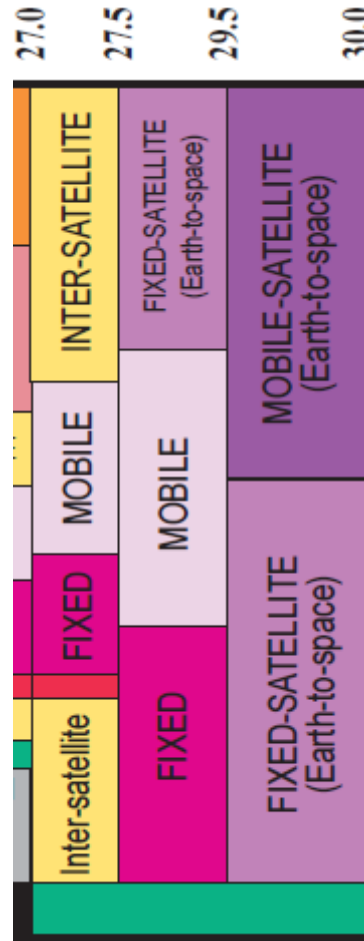




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US Allocation Chart, 2011



US Allocation Chart, 2003



30 GHz

28GHz band

RR 2008

27,5-28,5	FIJO 5.537A FIJO POR SATÉLITE (Tierra-espacio) 5.484A 5.516B 5.539 MÓVIL 5.538 5.540
28,5-29,1	FIJO FIJO POR SATÉLITE (Tierra-espacio) 5.484A 5.516B 5.523A 5.539 MÓVIL Exploración de la Tierra por satélite (Tierra-espacio) 5.541 5.540
29,1-29,5	FIJO FIJO POR SATÉLITE (Tierra-espacio) 5.516B 5.523C 5.523E 5.535A 5.539 5.541A MÓVIL Exploración de la Tierra por satélite (Tierra-espacio) 5.541 5.540

28GHz band

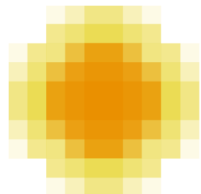
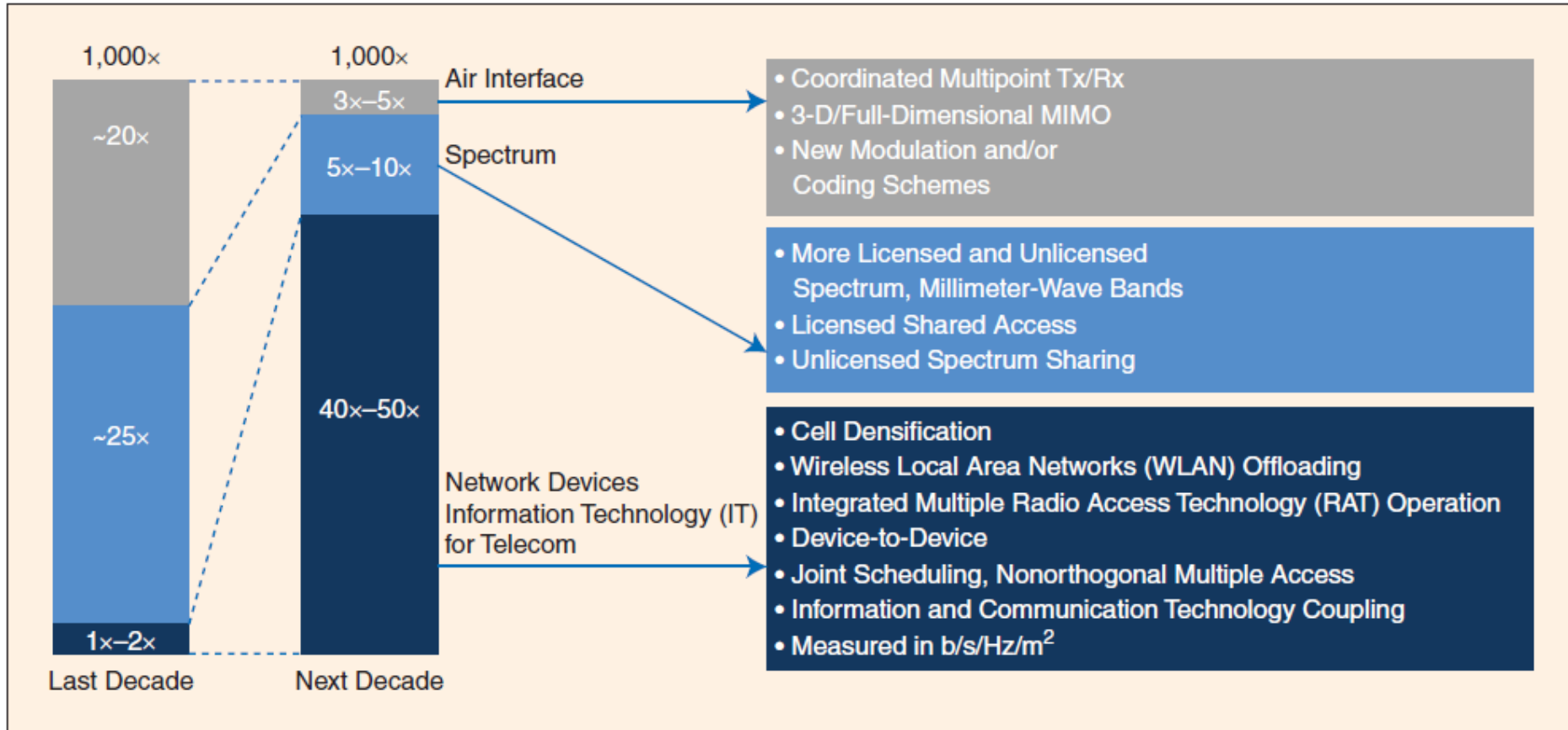
RR 2012

27,5-28,5	FIJO 5.537A FIJO POR SATÉLITE (Tierra-espacio) 5.484A 5.516B 5.539 MÓVIL 5.538 5.540
28,5-29,1	FIJO FIJO POR SATÉLITE (Tierra-espacio) 5.484A 5.516B 5.523A 5.539 MÓVIL Exploración de la Tierra por satélite (Tierra-espacio) 5.541 5.540
29,1-29,5	FIJO FIJO POR SATÉLITE (Tierra-espacio) 5.516B 5.523C 5.523E 5.535A 5.539 5.541A MÓVIL Exploración de la Tierra por satélite (Tierra-espacio) 5.541 5.540

Comments

- If capacity is the factor for future IMT, the solution is not more spectrum, but better planning and optimization.
- Some bands like 28GHz provide good capacity, adequate coverage for pico/femto and are currently attributed.

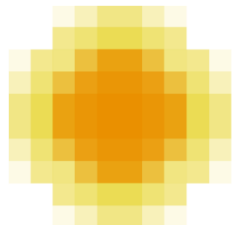
5G Network Capacity Factors



Conclusions

- There are a lot of work in the planning and optimization of IMT networks.
- HetNets are a solution for the capacity shortage.

THANK YOU



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