

5G Applications

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3GPP standards eco-system



- Participation in 3GPP is made possible by companies and organizations becoming members of one of the 3GPP Organizational Partners, the seven Standards Developing Organizations (SDOs) - from China, Europe, India, Japan, Korea and the United States.
- Specific inputs, in the form of market requirements may also come in to the Project via any of the 18 Market Representation Partners in 3GPP. These organizations have all signed up to the 3GPP Project scope and objectives.
- There is also a lot of external cooperation with other standards bodies and a broad variety of other groups, by way of formal Liaisons.



Formal External Liaisons

> 450 MHz Alli Blue

Bluetoo Broadband Forum (BE CableLa

(CIS

Digital Video Broadcasting (DVB) Proj

Ecma Internati

Euresc

European Radiocommunications Committee (ERC) Fixed Mobile Convergence Alliance (FMCA)

Global Certification Forum (GCF

Global TD-LTE Initiative (GTD

GPS Industry Counc

GSM Associatio

HomeRF Forum

IEEE

Internet Engineering Task Felov (IE

ternational Multimedia Telecomunicatio

Consortium (III

Internet Streaming Media Alliance

ISO-ITU expert gr

ITU-T SG:

atm APIs for Integrated Network

The Java Community Process (JCP

Liberty Alliance Pr

LTE/SAE Trial Initiative (LSTI

Metro Ethernet Forum (I

IGMN (Next Generation Mobile Net

OMA (Open Mobile Allia

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Open IPTV Forun Object Management Group (OMG

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TV-anytime

Ktensible Mark-up Language (VXM)

Wi-Fi A

WLAN Smart Card Consortiun Wireless World Research Forum (WWRF

World Wide Web Consortium (WW

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PTCRB GCF

Membership



3GPP Member Companies (2019 list)

450connect, 7LAYERS, Academy of Broadcasting Science, AccelerComm, Accuris, Acer, Acorn, Adare, Adtran, Adva Optical Networking, Aeroflex, Affirmed Networks, Airbus, Airwave, Alcatel-Lucent, Alibaba, Altan Redes, Altiostar, Amdocs, Analog Devices, Andrew Wireless Systems, Anemone, Anritsu, Apple, Applied Communication Sciences, AQSACOM, ARCEP (FR), AREA, ArgoNET, Aselsan, Asia Pacific Telecom, AsIaInlo, ASTRI (HK), ASTRID, Asustek, AT&T, AT4, Australian Government, Austrian Federal Ministry for Transport, Innovation and Technology, Autotalks, Avanti, Azimuth, BAE, BankID Norge, BBC, B-Com, BDBOS (DE), Beijing Jiaotong University, Bell Mobility, BfV (DE), Bharti Airtel, Bittium, BKA (DE), BlackBerry, Bluetest, BMWi (DE), Bolloré, Bostwana Communications Regulatory Authority, Bouygues, Broadcast Networks Europe, Broadcom, Brocade, BT, BTL, Bull, BUPT (CN), Bureau Veritas (TW), C Spire, CableLabs, Cadence, Cambium, Canon, Carnegie, Casa Systems, Catapult, China Academy of Telecommunication Research of MIIT, C-DOT (IN), Cellnex, Center for Internet Security (US), Centre tecnologic de Telecomunicacions de Catalunya, Ceragon, CENC (CN), CETECOM, CEWIT (IN), Charter Communications, Chen Si Electronics, China Academy of Information and Communications Technology, China Academy of Telecommunication, Chongqing University, CHITTL (TW), CICT (CN), Cisco, CITT (CN), CITCSAT (CN), CISC Peter-Service (RU), CKH IOD (UK). CNES - Centre National d'Etudes Spatiales (FR), Cobham, Cohere, Coherent Logix, Comcast, Commissariat à l'Energie Atomique et et aux Energies Alternatives.

Peter-Service (R	U), CKH IOD (UK). CNES - Cen	tre National d'Etudes Spatiales (FR), Cobham, Cohere, Coherent Logix, Como	cast, Commissariat à l'Energie	Atomique et et aux				
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ETS-Lindgr€	om, European Commis	opean Communications Office	ce, Europea Organisation, Eur	pace Agency, Eutelsat	mpliancy				
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et Finan	Ministerio de Industria (ES)	y of Economic Affairs (N	stry of Transport, Construction	ional Development (SK), N	'RE, Mitsubishi,				
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Establish), National Institute of Info	and Communications	ogy (JP), National Institute of St	and Technology (US), Nation	ıments,				
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TSG Core & Terminals	CT		Lionel	Morand	Orange
	CT	1	Peter	Leis	Nokia
	CT	2	lan	Harris	
	СТ	3	Susana	Fernandez	Ericsson
		_			
	СТ	4	Peter	Schmitt	Huawei
	СТ	6	Heiko	Kruse	IDEMIA
TSG Radio Access Networks	RAN		Balazs	Bertenyi	Nokia
134 Radio Access Networks	IVAI V		Duluzs	Dertellyi	Nokia
	RAN	1	Wanshi	Chen	Qualcomm
	NAIN	1	vvalisiii	Chen	Qualconnin
	DAN	2	Diala and	D	latal
	RAN	2	Richard	Burbidge	Intel
	DANI	2	C'a a	N. A. a. disab	Fatanan
	RAN	3	Gino	Masini	Ericsson
	RAN	4	Xutao	Zhou	Samsung
	RAN	5	Jacob	John	Motorola
	RAN	6	Juergen	Hofmann	Nokia
TSG - Services and System Aspects	SA		Georg	Mayer	HuaWei
				Almodovar	
	SA	1	Jose Luis	Chico	TNO
	SA	2	Puneet	Jain	Intel
	SA	3	Noamen	Ben Henda	Ericsson
	SA	3	ivoamen	вен пениа	Ericsson
	SA	4	Frederic	Gabin	Ericsson
	SA	5	Thomas	Tovinger	Ericsson
	SA	6	Suresh	Chitturi	Samsung

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Multiple breakthrough technologies



Perfect storm of:

- Low latency radio with fully flexible network
- Artificial Intelligence and Automation
- Device revolution for AR/VR
- Vertical industries going cellular



Is it just the same old faces?

35P

■ 3GPP Members now include, for example:

- Agricultural machinery manufacturers (e.g., John Deere, Husqvana, etc)
- Automotive manufactures (e.g, Volkswagen, Volvo, Toyota)
- Rail (e.g., Internationale Union of Railways)
- Factory Automation companies (e.g., Siemens)
- Energy Sector (e.g., Legrand)
- Environment (e.g., Veolia)
- Broadcasting Community (e.g., EBU, BBC, TDF)
- Satellite Community (e.g., ESO, Inmarsat)
- Aerospace (e.g., Lockheed Martin, BAE)
- **Retail** Sector (e.g., Alibaba)
- Social Media (e.g., Facebook)
- Advertising (e.g., Google)

Full listing available here:

http://www.3gpp.org/about-3gpp/membership













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Where are we now on 5G?





- 3GPP continues to expand the LTE platform to improve its efficiency to meet the mobile broadband demand
- 3GPP is on schedule with the standardization of 5G, addressing the expanded connectivity needs of the future
- Phases for the normative 5G work
 - Phase 1 (Rel-15): Addresses the more urgent subset for commercial deployments
 - Phase 2 (Rel-16): Completes the IMT 2020 submission, addresses all identified use cases & requirements



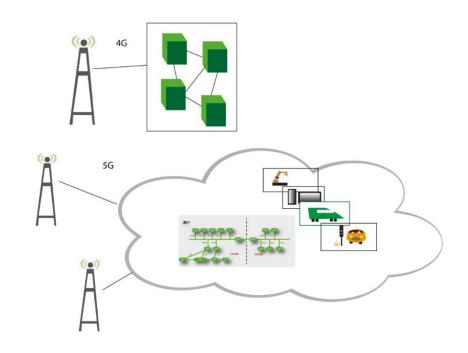
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Network Transformation



- One Network fits all → Open & Flexible Enabler
- ▼ Telecom Operators → Multiple Stakeholders

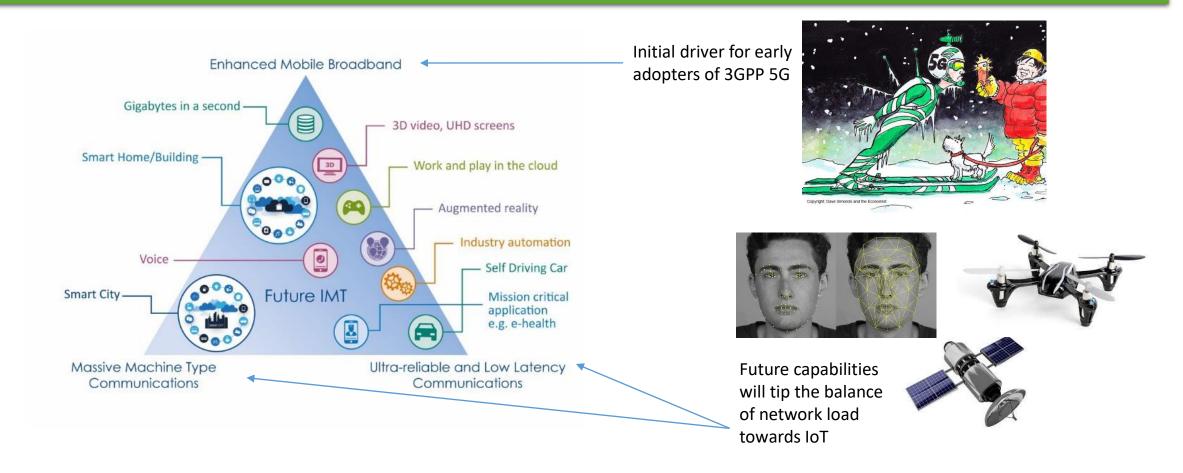
- Static Topology On-demand Resources
- - Network Function → Virtualization
 - Single Network → Slice



The IMT vision







Future outlook





- Vehicle Communication, Mission Critical Communications, Industrial IoT, Audio Visual Production...
- Enhancements for the system coming:
 - 5G LAN, High Precision Positioning, Cellular IoT for 5G, URLLC capabilities, Fixed and Satellite as 3GPP accesses, ONAP interworking, QoS Monitoring, Network Automation, protocol and core network improvements...
- 5G will span several releases, look out for the Rel-17 work plan soon

36Release 17 Functional Freeze: June 2021*

- TSG SA content & prioritization discussion at SA#85 (september 2019):
- 5G System Enhancement for Advanced Interactive Services
- Cellular IoT enhancement for the 5G System
- System enhancement for Proximity based Services in 5GS
- Enhancement of support for 5G LAN-type service
- Integration of Satellite in 5G Systems
- Architectural enhancements for 5G multicast-broadcast services
- Support for 5G Wireless Wireline Convergence
- Application Awareness Interworking between LTE and NR
- Extended Access Traffic Steering, Switch and Splitting support in the 5G architecture
- Enhanced IMS to 5GC Integration
- Enhancement to the 5GC LoCation Services Phase 2
- Enablers for Network Automation for 5G Phase 2
- Enhancement of support for Edge Computing in 5GC
- Enhanced support of Non-Public Networks
- Enhancement of Network Slicing Phase 2
- Enhancement of 5G UE Policy
- Architecture enhancements for 3GPP support of advanced V2X services - Phase 2
- Supporting Flexible Local Area Data Network
- Supporting Unmanned Aerial Systems Connectivity, Identification, and Tracking
- Enhanced support of Industrial IoT TSC/URLLC enhancements
- Multimedia Priority Service (MPS) Phase 2
- Support for Multi-USIM Devices
- System architecture for next generation real time communication services
- Service-based support for SMS in 5GC
- Smarter User Plane
- UPF enhancement for control and SBA
- Usage of User Identifiers in the 5G System
- Enhancements for cyber-physical control applications in vertical domains
- Support for Minimization of service Interruption
- Complete Gap Analysis for Railways Mobile Communication System

TSG RAN Work Areas under discussion

For final decision on the Rel-17 content at RAN#86 (December 2019):

- NR Light
- Small data transfer optimization
- Sidelink enhancements
- NR above 52.6 GHz (inlc 60GHz unlicensed)
- Multi SIM operation
- NR multicast broadcast
- Coverage enhancements
- NB-IoT and eMTC enhancements
- Industrial IoT & URLLC enhancements
- MIMO enhancements
- NR for Non Terrestrial Networks
- Integrated Access and Backhaul enhancements
- Generic enhancements to NR-U
- Power saving enhancements
- RAN data collection enhancements
- Positioning enhancements

Projected

9

Conclusions



- 3GPP is an industry driven standardization activity with truly global reach
- Standardization of interfaces enables an interoperable, multi-vendor approach to deployment and generates mass market economies of scale
- NR remains high focus for RAN groups
- IMT-2020 '5G' process progressing 3GPP leading the way
- Release 16 focus continues to expand towards new use cases and new sectors
- The 3GPP processes are necessarily complex, but we need to adapt to bring new sectors in to the work
- 5G will be a multi-Release technology (beyond Release 16), Rel-17 in the planning stage

For more Information







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