5G for the

4th Industrial Revolution

October 2019

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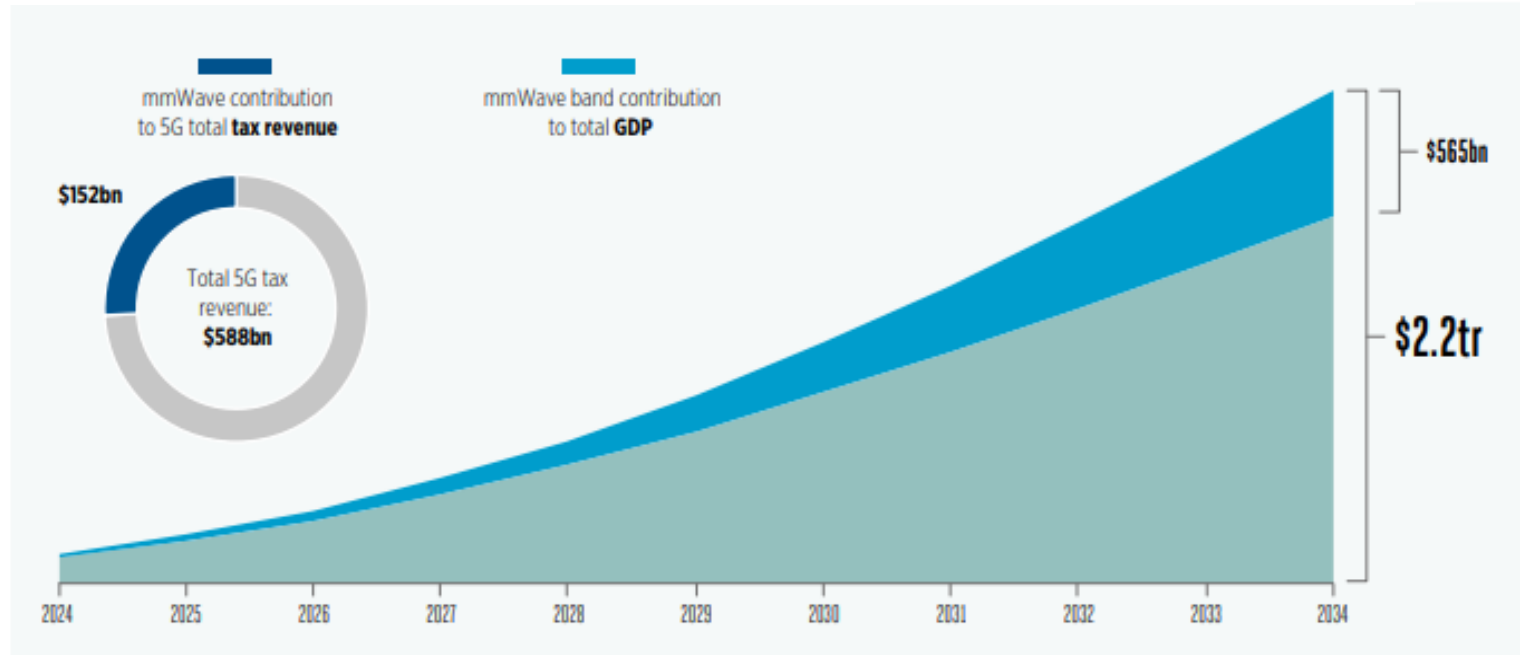
mmWave 5G Impacts

Regional Spotlight

5G is expected to contribute $2.2 trillion to global GDP

ESTIMATED IMPACT ATTRIBUTABLE TO MMWAVE SPECTRUM ON GDP AND TAX REVENUE
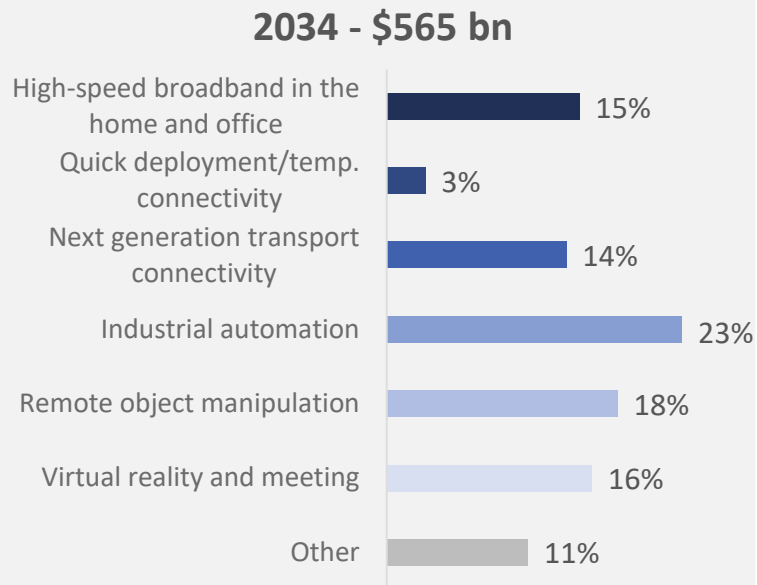
mmWave contribution to 5G total **tax revenue**

mmWave band contribution to total **GDP**

$152bn

Total 5G tax revenue: **$588bn**

$565bn

$2.2tr

2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034

Source: TMG.

mmWave 5G expected to boost global GDP by $565bn

Initial study (released December 2018) found that releasing mmWave bands for 5G will contribute $565bn to global GDP by 2034.

GDP - **$565 billion USD** by 2034

AsiaPac	212bn
Americas	190bn
Europe	135bn
MENA	15.4bn
RCC	6.7bn
SSA	5.2bn
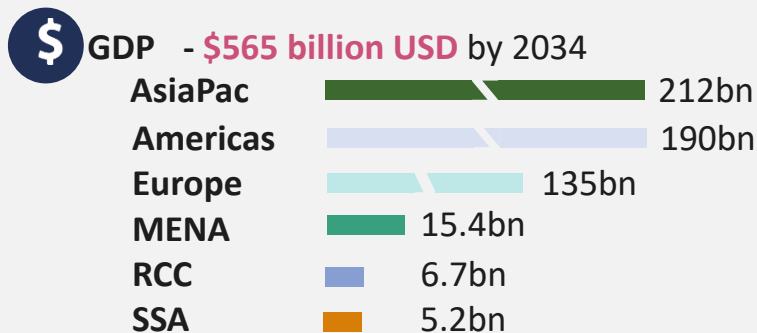
Key six use cases likely to be chief beneficiaries of mmWave 5G.

2034 - $565 bn

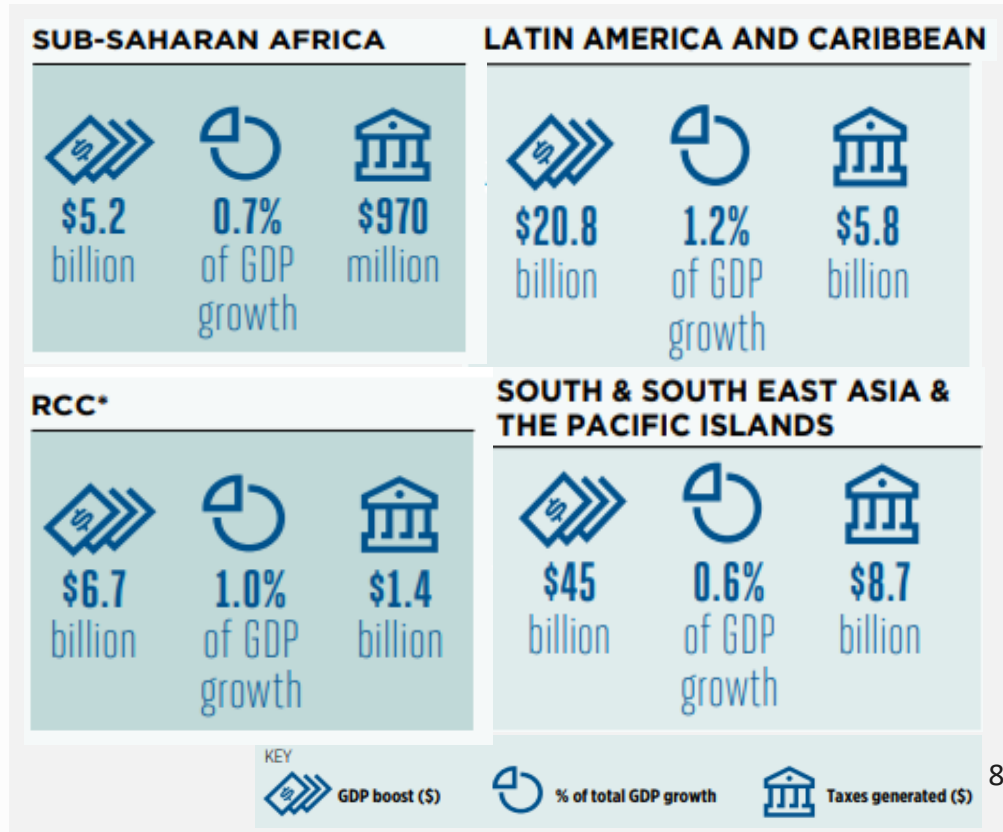|	
High-speed broadband in the home and office	15%
Quick deployment/temp. connectivity	3%
Next generation transport connectivity	14%
Industrial automation	23%
Remote object manipulation	18%
Virtual reality and meeting	16%
Other	11%

Regional spotlight considers mmWave impact on four regions

Initial study also looked at contributions by region/sub-region for greater clarity into how mmWave 5G may impact developing regions, notably:

- Sub-Saharan Africa
- South and South East Asia and the Pacific Islands
- Latin America and Caribbean
- Regional Commonwealth in the field of Communications

These four regions are the focus of follow-on Regional Spotlight report.

SUB-SAHARAN AFRICA

$5.2 billion — 0.7% of GDP growth — $970 million

LATIN AMERICA AND CARIBBEAN

$20.8 billion — 1.2% of GDP growth — $5.8 billion

RCC*

$6.7 billion — 1.0% of GDP growth — $1.4 billion

SOUTH & SOUTH EAST ASIA & THE PACIFIC ISLANDS

$45 billion — 0.6% of GDP growth — $8.7 billion

KEY

GDP boost ($)   % of total GDP growth   Taxes generated ($)

Regional spotlight considers mmWave impact on four regions

In each of the four regions, the report explores **two key cases studies** where mmWaves can be used to enable new or improved tools or processes to improve economic growth or quality of life.

SUB-SAHARAN AFRICA

- Case Study #1: Smart transportation logistics hubs
- Case Study #2: Extractive industries

REGIONAL COMMONWEALTH IN THE FIELD OF COMMUNICATIONS (RCC)

- Case Study #1: Automation across industry
- Case Study #2: Healthcare

SOUTH AND SOUTH EAST ASIA AND THE PACIFIC ISLANDS

- Case Study #1: Connectivity
- Case Study #2: Disaster Communications

LATIN AMERICA AND THE CARIBBEAN (LAC)

- Case Study #1: Education
- Case Study #2: Transportation

Regional Spotlight: RCC

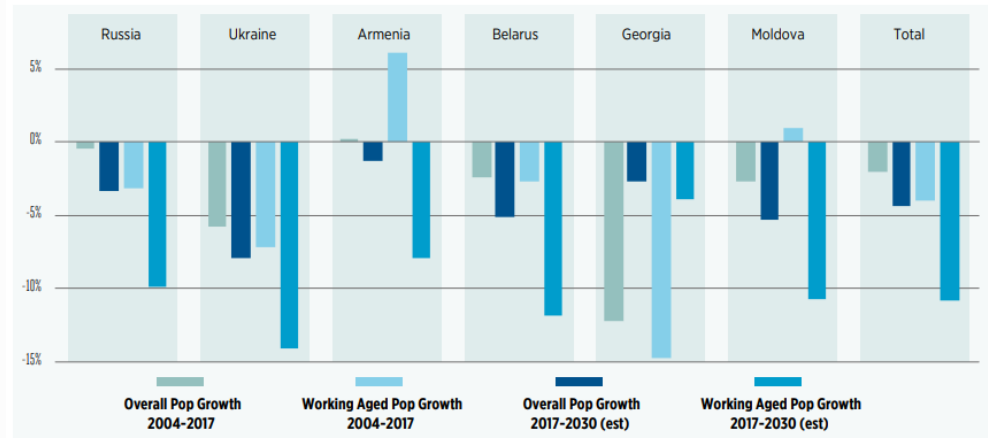Case Study One: Automation by Industry

Case Study Two: Healthcare

Case Study #1: Automation across industry

Why was this case study chosen?

- RCC has well-educated populations, extensive transport infrastructure, and high industrial capacity, due in part to its shared political legacy

- However, labor supply is **declining**, which can lead to possible reductions in productivity and profitability

- mmWave 5G can assist by increasing the utilization of the workforce, especially given the region's strong foundation of skills, infrastructure, and industrial capacity
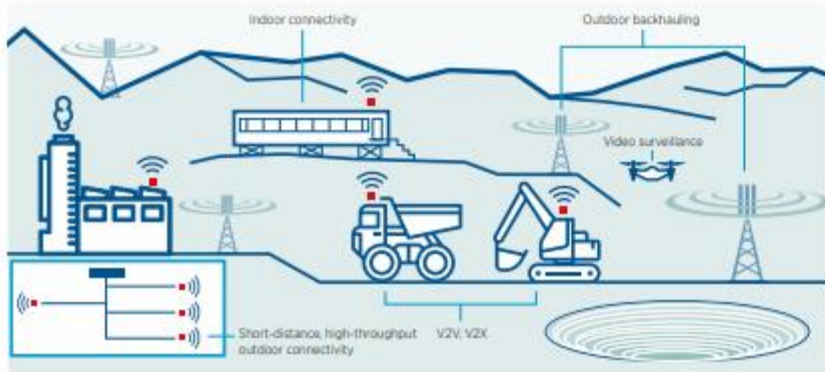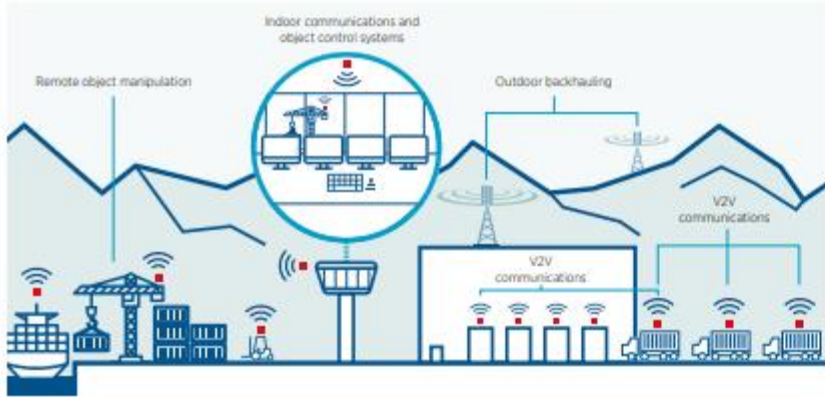

FIGURE 17. GROWTH RATES OF OVERALL AND WORKING-AGE POPULATIONS IN SELECTED RCC COUNTRIES, 2004-2030

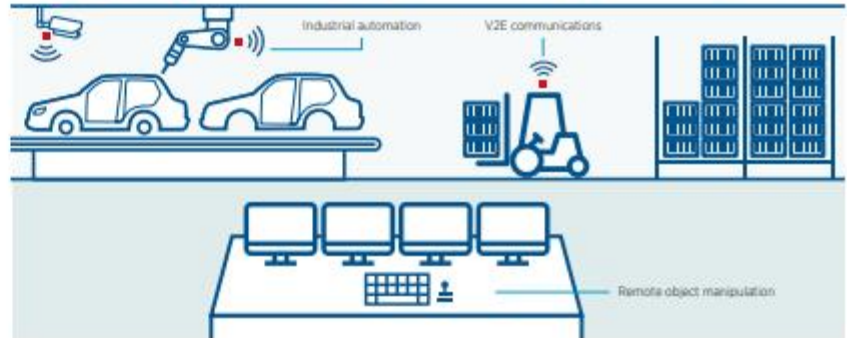Source: TMG based on data from PopulationPyramid.net

Case Study #1: Automation across industry
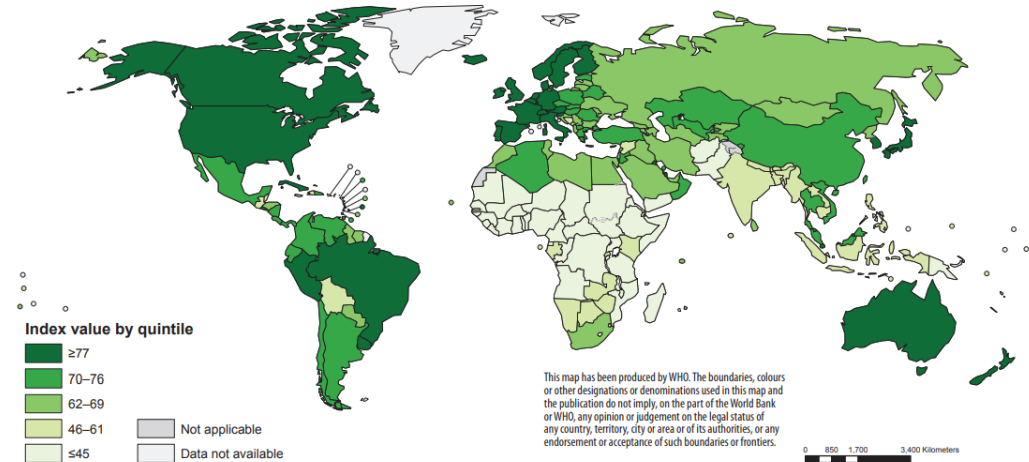

EXTRACTIVE INDUSTRIES

TRANSPORT

LOGISTICS

MANUFACTURING

Case Study #2: Healthcare

Why was this case study chosen?

- While healthcare has improved, there are still challenges facing the region to provide essential health services:

  - Comprehensive and continued training for doctors

  - Access to high-quality healthcare in rural and remote areas

  - Other problems related to a political legacy in which decision-making and resources were highly centralized and primary care underemphasized

- mmWave 5G can improve availability and access to quality services where local resources are inadequate and benefit diagnostics and healthcare management

Fig. 1. UHC service coverage index by country, 2015: SDG indicator 3.8.1

Index value by quintile
- ≥77
- 70–76
- 62–69
- 46–61
- ≤45
- Not applicable
- Data not available

This map has been produced by WHO. The boundaries, colours or other designations or denominations used in this map and the publication do not imply, on the part of the World Bank or WHO, any opinion or judgement on the legal status of any country, territory, city or area or of its authorities, or any endorsement or acceptance of such boundaries or frontiers.

Source: World Bank and WHO, "Tracking Universal Health Coverage: 2017 Global Monitoring Report."

Case Study #2: Healthcare
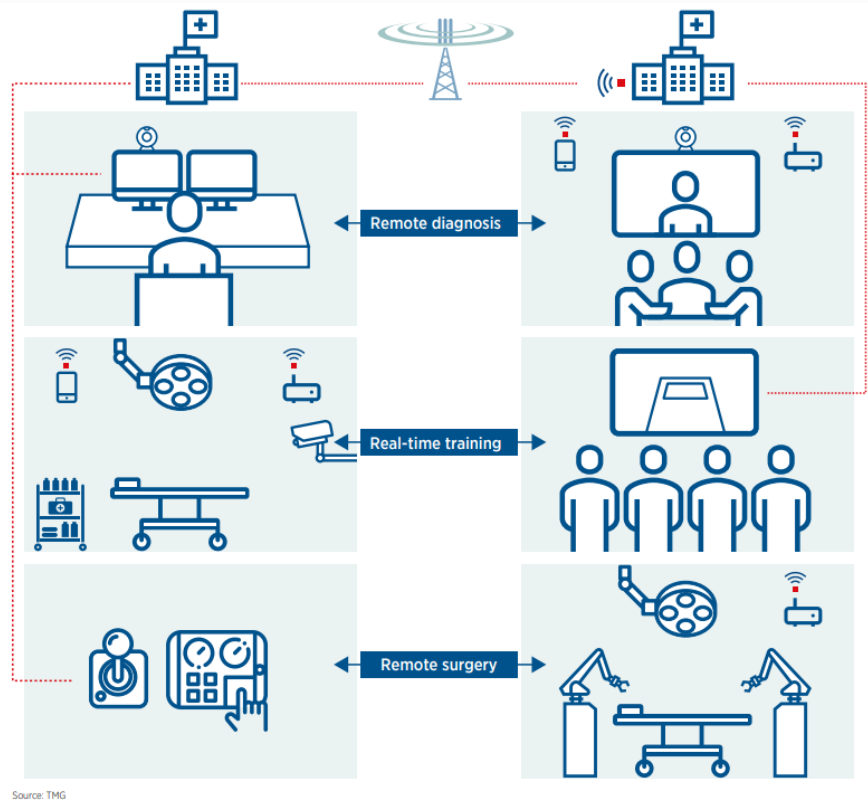
- **Remote diagnosis**: qualified staff not on-location can diagnosis in real-time with 5G-enabled devices

- **Real-time training**: Ad-hoc and ongoing training from remote specialists using mmWave 5G networks, tactile AR/VR learning applications, and next-generation video conferencing

- **Remote surgery**: remote object manipulation allows remote surgery using mmWave 5G's low latency and high-speed data rates

mmWave 5G will bring important economic benefits to RCC

- 5G is expected to raise global GDP by $2.2 trillion, of which $565 billion will come from attributing mmWave band spectrum

- For RCC, GDP will increase by an estimated $6.7 billion as a result of allocating mmWave band spectrum for IMT

- There are a number of relevant mmWave 5G applications in the mid-term, especially industrial automation, remote object manipulation, next generation transport connectivity, and virtual reality.

RCC*

$6.7 billion   1.0% of GDP growth $1.4 billion
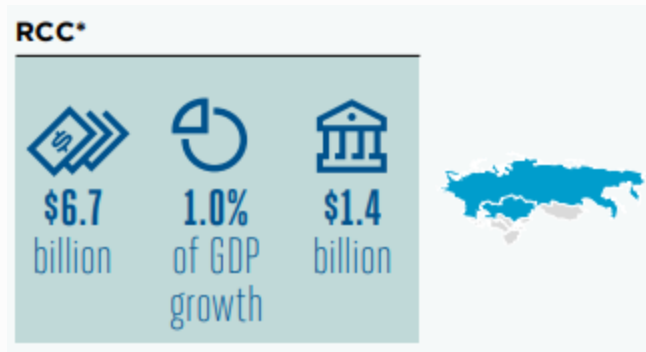
To realize these benefits, regulators should:
- Support the different conditions and proposals for WRC-19 related to 5G, particularly the recommendation to identify the 26 GHz, 40 GHz and 66-71 GHz bands for IMT.
- Advocate for the regional and global harmonization of the use of these different bands, with due consideration for their frequency arrangements and minimum block sizes.
- Aim to make available 80-100 MHz of contiguous spectrum per operator in prime 5G mid-bands (e.g. 3.5 GHz) and around 1 GHz per operator in millimeter wave bands (i.e. above 24 GHz).

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