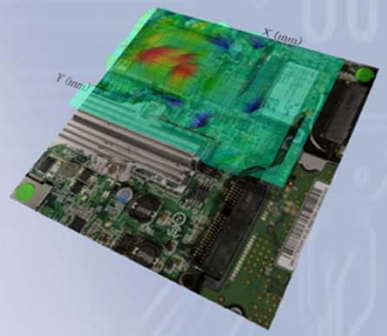
Sensitivity in Frequency



Compliance Testing of 5G Devices

"Operational in close proximity to the head and body"

APREL Inc

MADE IN CANADA

Kanata, Ontario, Canada.

APREL

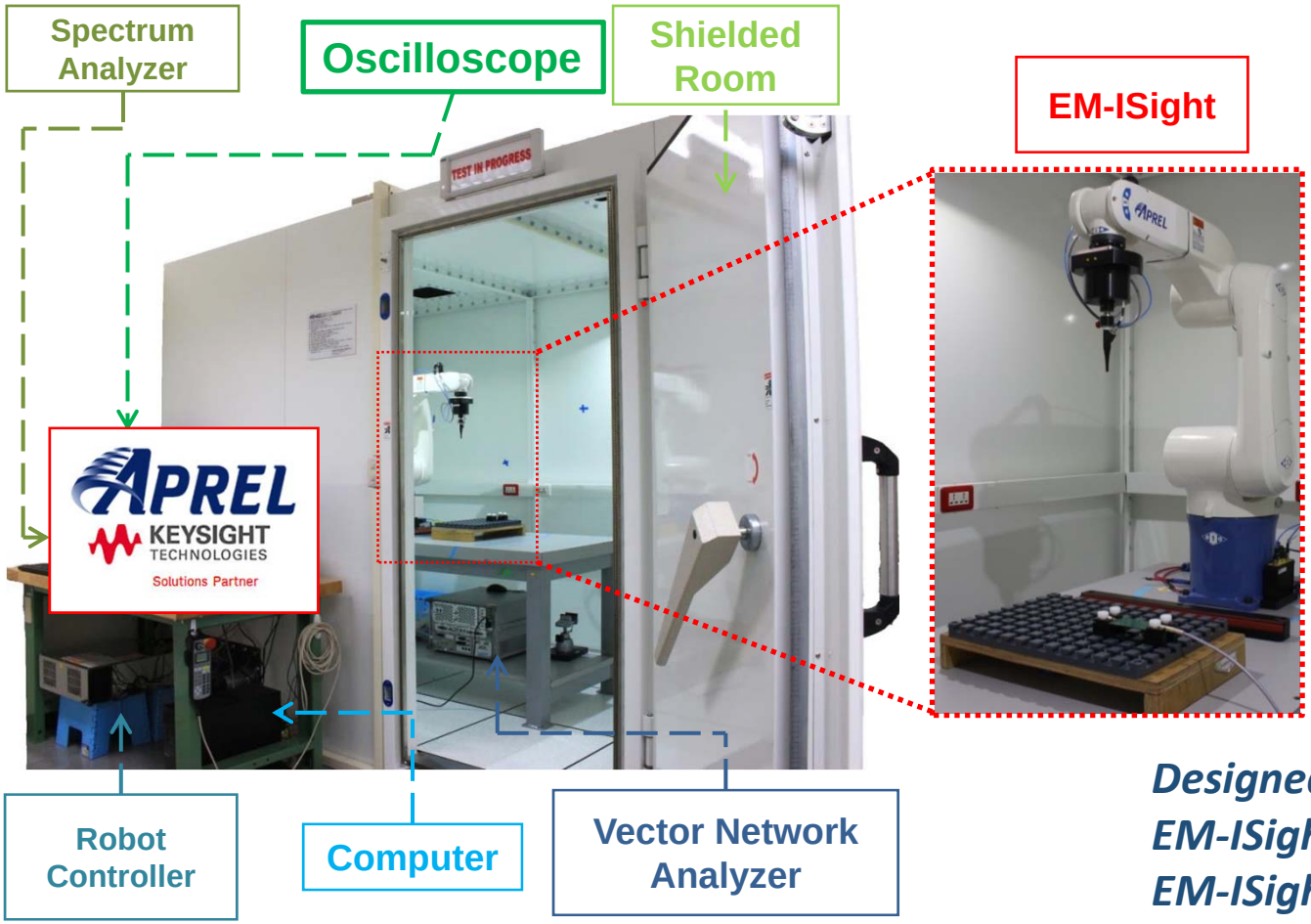
IEC IEEE

Introduction

- APREL Inc. was formed in 1981 in Ottawa Canada with over 35 years experience in communications technology
- Based in Kanata, Ontario Canada with a support office in Taipei Taiwan, Seoul South Korea and Penang Malaysia
- Hold key positions on international standards development committees including IEC
- First automated system shipped to Panasonic in 2001, first EM-ISight system shipped to Intel in 2010
- Over 60 installation sites globally operating in automotive, aviation, electronics, enterprise solutions and mobile communications
- APREL are a Keysight solutions partner
- Ability to create custom solutions for customers
- All systems developed and manufactured in Canada

Sensitivity in Frequency

Turnkey Solutions



Designed For,
EM-ISight-ER
EM-ISight-LR
EM-ISight-AMS

APREL use Keysight Test equipment!!

APREL

Previous Policies

- In the past few years the FCC required 5G devices ***e.g. 802.11AD*** to be tested under the PBA (Permit But Ask) process
- No standard or generic procedures were specified, methods used were based on ability of test laboratory
- A limited number of 5G devices on the market – not a lot of compliance certificates were issued by regulators and in some regions none issued e.g. Canada
- Methods:
  - Simulation
  - Far-field to near-field reconstruction method
  - Use of existing 3M/10M Chambers

Current Status

- In May of 2018 the new IEC Technical Report will be published, this will include all proposed and submitted methodologies
- The new methods of near-field evaluation of power density submitted include,,,,

  1. Full E- and H- field measurements closer than 1 wavelength to the device under test

  2. One field type (E/H) measured closer than one wavelength to the device under test, another field reconstructed based on that which was measured

  3. One field measured further than one wavelength from the device under test, another reconstructed through back propagation technique
- FCC is questioning the conservativeness of the reconstruction methods #2 and #3, **nobody knows yet what direction the FCC or other regulators will take**

Development of New Standard

- The joint-logo IEC/IEEE standard for Power density evaluation of 5G devices is currently under development – this work started in January 2018
- Methods for near-field measurements are under evaluation which will be the basis of this new standard, **a far-field measurement procedure has not been proposed**
- ICNIRP and IEEE ICES 5G working groups will prepare the permissible limits as well as definitions and requirements for the power density assessment – **expectation is that it should be ready by the end of June 2018**

Regulators' Requirements

- FCC and other regulators always follow the **most conservative methodologies** for the assessment of devices operating in close proximity to the human head and or body
- There is a risk regulators may not agree on the standards methodologies which are proposed, this is why systems must be flexible in the approach to testing 5G devices
- What is clear is that current far-field methods **will not be acceptable once the IEC/IEEE Technical Report has been published**, this method is on a count down to obsolescence
- There is no simple solution for 5G testing:
  - the uncertainties are not yet defined
  - probe calibration procedures are not established
  - system validation/verification guidance is under development but not yet defined

APREL EM-ISight / RF-ISight Solution

- **APREL have developed a comprehensive method** for measurements in the near-field zone through testing of existing **5G (Wigig) and Beam Forming** devices
- Vector detecting E and H probes allow for the evaluation of the 5G devices up to **110GHz at a distance of 0.5 mm** from a device surface – THIS is only system that can get that close to the source of electromagnetic energy
- The flexibility of the **APREL measurement system** includes a robust analytical application which together with our integration is able to employ any of **existing methods currently proposed in the IEC/IEEE Technical Report which will be published in May 2018**

❖ **Whichever method the IEC/IEEE international committee or international regulators decides as essential for the MPE compliance testing the APREL solution can comply**

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Turnkey Solution Active & Power Density

5G IoT System Chamber

User Interface

LAN BUS

- Active DUT Control is defined/supported by the manufacturer
- No wireless communication test set can support beamforming yet, APREL will support when available

Access Panel RF In/Out

System Control Robotics' Test Equipment

DUT Control

E8267D PSG Vector Signal Generator (validation)

N9030B & M1971V PXA-B and Smart Mixer

APREL

5G Standard Timeline

- **Technical Report – May 2018**
- *First draft – September 2018*
- **Uncertainty evaluation – December 2018**
- *System validation – March 2019*
- **Second draft – September 2019**
- *Comments review – March 2020*
- **Final draft – second quarter 2020**
- *Comments review – September 2020*
- **Publication – January 2021**

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Questions?

We have comprehensive information for all topics covered in this presentation?