



# Test & Measurement Viewpoint

## Challenges in testing 5G components



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# Where EXFO helps the 5G boom, from lab to live



## LAB, R&D AND FACTORY TESTING

- PIC Testing
- Passive component
- 400G and beyond
- Transceivers
- Load testing and simulation



## FIELD TEST AUTOMATION

- Broadband access
- FTTx/PON
- Residential services
- Data centers
- Small cell rollout



## VALIDATE SERVICE READINESS

- 4G/5G transport backhaul, fronthaul X-haul
- Service and infrastructure
- Capacity certification
- Orchestration



## END-TO-END MONITORING

- Layer 0 to 7
- Fiber, RAN, RF and core monitoring
- NFV service assurance
- Active testing and passive monitoring
- Network, service and subscribers analytics



## AUTOMATED REAL-TIME INSIGHTS AND TROUBLESHOOTING

- RF and RAN optimization
- Dynamic topology, advanced use cases and automated troubleshooting

..... Design and test .....

..... Build and validate .....

..... Operate, assure and transform .....



# 5G Product Portfolio



Lab



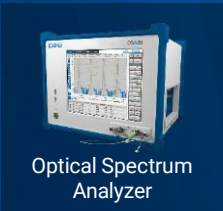
Field



Live



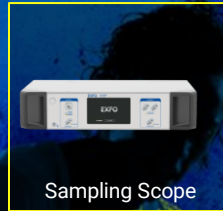
Component Tester



Optical Spectrum Analyzer



Bit-Error Rate Tester

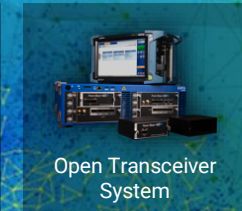


Sampling Scope



iOptics

Intelligent transceiver testing



Open Transceiver System



Fiber inspection



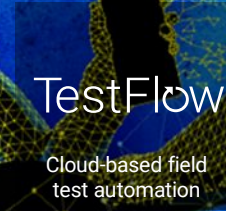
Optical fiber multimeter



OTDRs



iOLM



TestFlow

Cloud-based field test automation



iORF



EtherSAM  
ISAM

ITU-T Y.1564 & RFC 6349



10Mb to 100G Ethernet



Open Transceiver System



FTB 5GPro kit



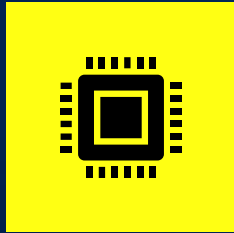
NOVA

Service assurance solutions



# 5G Component Testing

PIC-based components



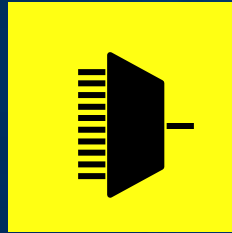
Evolving PIC technology

- Active
- Passive
- Hybrid

Thousands of devices  
100s comp/chip

Complex test stations  
Functional  
Parametric

Passive optical components



Complex devices

Diversity of components  
(M inputs, N outputs)

Test Speed vs Integrity

Test reliability vs CAPEX

New-generation Optical transceivers

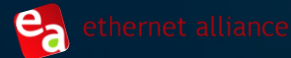


Diversity of transceivers

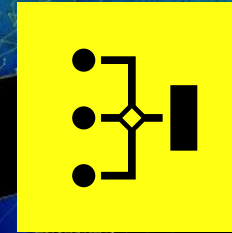
- Multiple tech
- Higher speed
- Tunability

Support form factors

- Quick
- Extensive
- Reliable



Converged 5G xHaul transport



Ubiquitous transport equipment for 5G

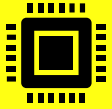
- New structure
- New equipments

Multiple protocols

Co-existence 5G / 4G

Ultra-high reliability





# PIC-based components for 5G



## CHALLENGE | SOLUTION | RESULTS

Active and passive component measurement

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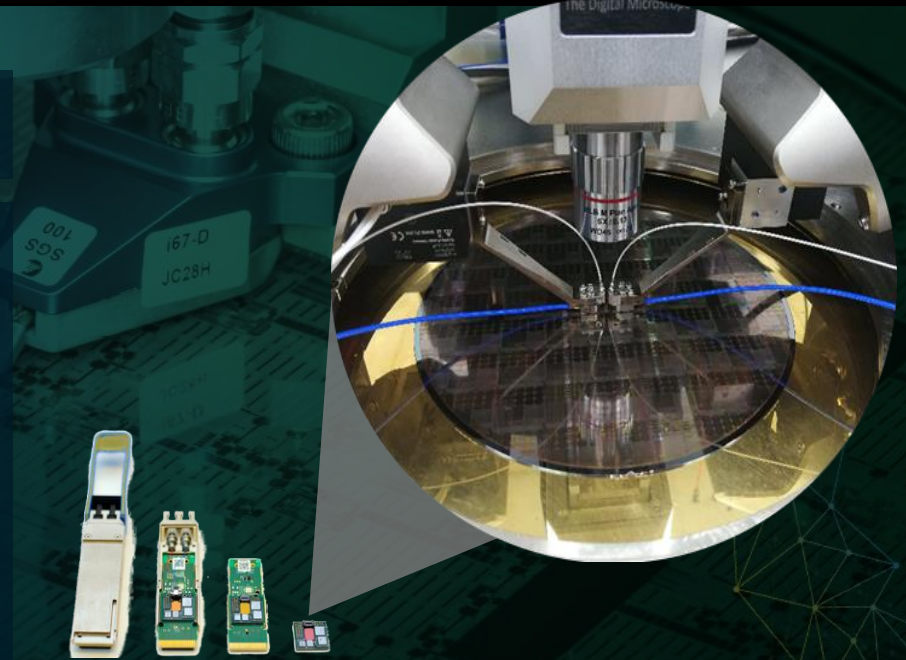
Characterization of thousands of components per wafer

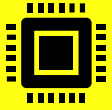
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Multivendor and complex test stations

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Testing at different stages: wafer level, die level, packaging, quality assurance





# PIC-based components for 5G



CHALLENGE | SOLUTION | RESULTS

## OSA20 & CTP10

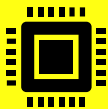
Active and passive optical component testing

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Swept optical testing provides fast acquisition with picometer resolution and accuracy

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Full remote control via SCPI commands

.....  
Wafer-level and final testing after packaging





# PIC-based components for 5G



## CHALLENGE | SOLUTION | RESULTS

OSA20 for transceiver testing: measurement of key parameters such as central wavelength, SMSR and OSNR

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CTP10 for passive component testing: IL, RL, PDL, incl. AWG or ring resonators **in record time.**

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High dynamic range measurement in a single scan, ensuring fast and reliable results

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Proven integrations with several probe station manufacturers

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Consistent measurements using the same test instruments throughout all the manufacturing stages

## CTP10 analysis results

