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Physical Layer Security for IIoT and CPPS: A Cellular Network Security Approach

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IIoT and CPPS





Motivation	PhySec	Testbed	d Conclusion	\supset

IIoT and CPPS



- What do we have?
 - inter-connected devices
 - wireless connections
 - sensitive date

- What are the requirements?
 - authentication of the participating entities
 - encryption of data & content

Sound and secure communication!

Motivation PhySec	Testbed	Conclusion	>
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Physical Layer Security (PhySec)



Physical Layer Security comprises a series of technical processes in which the generation of cryptographic credentials is based on different physical properties.



Testbed

Conclusion

PhySec

Motivation

Secret Key Generation



- Secret Key Generation \rightarrow Channel-PUF
 - channel properties (reflection, diffraction, scattering)
 - extract shared secret
 - enhancement of existing cryptographic methods



Cellular PhySec



• Current field of research

- PhySec in Multi-Antenna cellular networks [1]
- system model, including different application scenarios [2]
- safeguarding the upcoming 5G wireless communication networks [3]



Channel Reciprocity





LTE PhySec Testbed





First Results





Conclusion



- We described vulnerabilities associated with the current changes in the industrial landscape
- PhySec offers a worthwhile solution to meet the requirements
- We propose a testbed to provide real-world measurements of NGMN-PhySec algorithms
- the first results of the evaluation are promising

Motivation	PhySec	\geq	Testbed	\rightarrow	Conclusion	\supset
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References



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[3] N. Yang, L. Wang, G. Geraci, M. Elkashlan, J. Yuan, and M. Di Renzo, "Safeguarding 5G wireless communication networks using physical layer security", *IEEE Communications Magazine*, vol. 53, no. 4, pp. 20–27, 2015. DOI: 10.1109/MCOM.2015.7081071.

Motivation	PhySec	> Testbed	Conclusion
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Thank you!

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