LIDS’80 Session on Information Theory, Communications, and Networks: Achievements and Challenges

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The Past: Information Theory and Coding

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• Many present coding techniques were invented at MIT or by MIT alumni: Product codes, convolutional codes, sequential decoding, LDPC codes, threshold decoding, concatenated coding, Berlekamp-Massey algorithm, Viterbi decoding, ...
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- Classics of the field ...
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- All-optical networking
- Wireless communications, MIMO communications
LIDS as a Pioneer of Ideas

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- A prime case in point is LDPC codes – the work-horse of WiFi and 5G – which was an idea some three decades ahead of its time
The present landscape

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- endpoints, where data is generated and used,
- core, where data is moved around, stored, and processed,
- edge, where the endpoints and the core meet.

Source: IDC’s Data Age 2025 study, sponsored by Seagate
Data growth

Annual Size of the Global Dataspere

Source: Data Age 2025, sponsored by Seagate with data from IDC Global DataSphere, Nov 2018
Challenges

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- Data processing challenges
5G envisages a proliferation of communication services
5G vision

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- Can a single standard cover such a diversity of services?
Forecast

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• Routine product-cycle fixes will not meet the growing demand for data communications as VLSI technology stalls
• Information theory will continue to play a key role in building ever more sophisticated communication systems
• LIDS-style pioneering research on communications and networking will continue to be relevant for decades to come
Happy 80th Anniversary!!!