

# Priv.-Doz. Dr. Thomas Dreibholz

Researcher and Developer for Computer Networks



## Personal Details

<b>Academic Titles</b>	✓ Priv.-Doz. Dr. rer. nat. Dipl.-Inform.
<b>First Name</b>	✓ Thomas
<b>Surname</b>	✓ Dreibholz
<b>Internet</b>	✓ <a href="mailto:dreibh@iem.uni-due.de">dreibh@iem.uni-due.de</a> ✓ <a href="https://www.uni-due.de/~be0001">https://www.uni-due.de/~be0001</a>
<b>OpenPGP Key</b>	✓ 21412672518D8B2D1862EFEF5CD5D12AA0877B49 ( <a href="https://www.uni-due.de/~be0001/key.asc">https://www.uni-due.de/~be0001/key.asc</a> ) Fingerprint: 2141 2672 518D 8B2D 1862 EFEF 5CD5 D12A A087 7B49
<b>Work Address</b>	✓ Simula Metropolitan Centre for Digital Engineering A/S Centre for Resilient Networks and Applications (CRNA) Pilestredet 52 0167 Oslo Norway

## Work Experiences

### Current Position

<b>2012 – ...</b>	✓ Chief Research Engineer at the Simula Metropolitan Centre for Digital Engineering (part of the Simula Research Laboratory) in Oslo, Norway. <a href="https://www.simula.no">https://www.simula.no</a> Responsibilities: <ul style="list-style-type: none"><li>• <b>Research:</b> Multi-Path Transport, Multi-Path TCP (MPTCP), Quality of Service (QoS), Network Security, Network of the Future</li><li>• <b>Development:</b> Development and management of the NORNET CORE testbed environment</li></ul>
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## Work Experiences (continued)

### Previous Work Experience

- 2001 – 2012**
- ✓ Associate professor in the Computer Networking Technology Group at the Institute for Experimental Mathematics of the University of Duisburg-Essen in Essen, Germany.  
<https://www.tdr.wiwi.uni-due.de>  
Responsibilities:
    - **Research:** Stream Control Transmission Protocol (SCTP), Reliable Server Pooling (RSerPool), Flow Routing, Quality of Service, Network Security
    - **Teaching:** Network Protocols, Network Security, Quality of Service, Linux Traffic Control
- 2002 – 2012**
- ✓ Cisco Certified Academy Instructor (CCAI) of the Cisco Networking Academy at the University of Duisburg-Essen in Essen, Germany.  
<http://cna.uni-due.de>  
Responsibilities:
    - **Teaching:** Cisco Networking Academy (CNA) curriculum
    - **Administration:** Academy, course and student management, Administration of the academy website
- 2000**
- ✓ Research assistant in the Computer Networking Technology Group at the Department of Computer Science IV of the University of Bonn in Bonn, Germany.  
<https://net.cs.uni-bonn.de>

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## Education

- March 2012**
- ✓ **Habilitation (Priv.-Doz.) in Computer Science** at the University of Duisburg-Essen in Essen, Germany.
    - **Thesis:** Evaluation and Optimisation of Multi-Path Transport using the Stream Control Transmission Protocol
    - **Advisors:** Erwin P. Rathgeb, Ralf Steinmetz, Paul Müller  
<https://www.uni-due.de/~be0001/sctp/>
- March 2007**
- ✓ **Ph.D. Degree (Dr. rer. nat.) in Computer Science** at the University of Duisburg-Essen in Essen, Germany.
    - **Thesis:** Reliable Server Pooling – Evaluation, Optimization and Extension of a Novel IETF Architecture
    - **Advisors:** Erwin P. Rathgeb, Klaus Echtler  
<https://www.uni-due.de/~be0001/rserpool/>
- October 2002**
- ✓ Certification as **Cisco Certified Network Associate (CCNA)** and **Cisco Certified Academy Instructor (CCAI)** at the Cisco Networking Academy of the University of Duisburg-Essen in Essen, Germany.  
<http://cna.uni-due.de>
- May 2001**
- ✓ **Master's Degree in Computer Science (Dipl.-Inform.)** at the University of Bonn, Germany.
    - **Thesis:** Management of Layered Variable Bitrate Multimedia Streams over DiffServ with A Priori Knowledge
    - **Advisors:** Peter Martini, Armin B. Cremers  
[https://www.uni-due.de/~be0001/diplom/index\\_e.html](https://www.uni-due.de/~be0001/diplom/index_e.html)
- October 1998**
- ✓ **Bachelor's Degree (Vordiplom) in Computer Science** at the University of Bonn, Germany.  
<https://www.informatik.uni-bonn.de>

## Awards

- September 2015** ✓ **Best Paper Award** for the paper “[Eclipse: A New Dynamic Delay-based Congestion Control Algorithm for Background Traffic](#)” at the 18th International Conference on Network-Based Information Systems (NBiS 2015).
- December 2014** ✓ **Best Paper Award** for the paper “[Measuring and Comparing Internet Path Stability in IPv4 and IPv6](#)” at the 5th IEEE International Conference on the Network of the Future (NoF 2014).
- November 2009** ✓ **Science Award** of the Sparkasse Essen for the Ph.D. thesis “[Reliable Server Pooling – Evaluation, Optimization and Extension of a Novel IETF Architecture](#)”.
- November 2009** ✓ **Scientific Research Accomplishments of Institutions of Higher Education of Hainan Province Award** for the research project “Study of Next Generation Internet New Protocol – RSerPool” in cooperation with Hainan University in Haikou, Hainan/China.
- February 2008** ✓ **Best Paper Award** for the paper “[Reliable Server Pooling – A Novel IETF Architecture for Availability-Sensitive Services](#)” at the 2nd IEEE International Conference on Digital Society (ICDS 2008).

## Third-Party Funds

- 05/2012 – ...** ✓ Participation in the project realisation of “NORNET” (project number 208798/F50) within the INFRASTRUKTUR program of the Norwegian Research Council (Forskningsrådet).
- 01/2011 – 12/2011** ✓ Participation in application for and realisation of the extended project phase of “Systematic Evaluation and Further Development of the Transport Protocol SCTP” (original title: “Systematische Untersuchung und Weiterentwicklung des Transportprotokolls SCTP”) with the Deutsche Forschungsgemeinschaft (DFG).
- 01/2009 – 12/2010** ✓ Participation in application for and realisation of the first project phase of “Systematic Evaluation and Further Development of the Transport Protocol SCTP” (original title: “Systematische Untersuchung und Weiterentwicklung des Transportprotokolls SCTP”) with the Deutsche Forschungsgemeinschaft.
- 01/2007 – 12/2008** ✓ Participation in application for and realisation of the extended project phase of “Evaluation, Further Development and Standardization of a Protocol Architecture for Provisioning Highly-Available, Distributed Applications in IP Networks” (original title: “Bewertung, Weiterentwicklung und Standardisierung einer Protokollarchitektur für die Bereitstellung hochverfügbarer, verteilter Anwendungen in IP-basierten Netzen”) with the Deutsche Forschungsgemeinschaft.
- 10/2004 – 09/2006** ✓ Participation in application for and realisation of the first project phase of “Evaluation, Further Development and Standardization of a Protocol Architecture for Provisioning Highly-Available, Distributed Applications in IP Networks” (original title: “Bewertung, Weiterentwicklung und Standardisierung einer Protokollarchitektur für die Bereitstellung hochverfügbarer, verteilter Anwendungen in IP-basierten Netzen”) with the Deutsche Forschungsgemeinschaft.
- 12/2002 – 12/2003** ✓ Participation in the project realisation of “QoS Control for Mass-Market Broadband Delivered over DSL Technology” with British Telecom.
- 10/2001 – 03/2005** ✓ Participation in the project realisation of “KING – Key Components for the Internet of the Next Generation” with the German Ministry for Education and Research (Bundesministerium für Bildung und Forschung – BMBF) and Siemens AG.

## Open Source Software Projects

- 2017 – ...**
- ✓ **MELODIC – Multi-Cloud Execution-Ware for Large-scale Optimised Data-Intensive Computing**  
The vision of the MELODIC project is to enable federated cloud computing for data-intensive applications. Furthermore, it provides the user with an easy-to-use, unified cloud environment, which hides the complexity of a multi-cloud. Particularly, MELODIC combines OpenStack-based cloud systems with the geographic distribution of NorNet sites to provide a realistic test platform.  
<https://www.melodic.cloud>
- 2016 – ...**
- ✓ **HENCSAT – Highly Efficient Network Coding for Satellite Applications Testbed**  
HENCSAT investigates the benefits of combining Highly Efficient Network Coding (HEVC, H.265) video encoding with torrent transmission and multi-path transport. Goal is to optimise communication services – particularly also using satellite communication – for the communication with unmanned aerial vehicles (UAV) and vehicle convoys in remote areas.  
<https://goo.gl/iyXvJE>
- 2016 – ...**
- ✓ **NEAT – A New, Evolutive API and Transport-Layer Architecture for the Internet**  
The NEAT project wants to achieve a complete redesign of the way in which Internet applications interact with the network. Goal is to allow network services offered to applications – such as reliability, low-delay communication or security – to be dynamically tailored based on application demands, current network conditions, hardware capabilities or local policies. NEAT therefore particularly also supports multi-path communication with SCTP and Multi-Path TCP (MPTCP).  
<https://www.neat-project.org>
- 2015 – ...**
- ✓ **HiPerConTracer – High-Performance Connectivity Tracer**  
HIPERCONTRACER is an advanced PING/TRACEROUTE service. It performs regular PING and TRACEROUTE measurements over IPv4 and IPv6 among sites. Results are exported into an SQL database. Analysis scripts can then access this data for research on network connectivity and resilience, as well as for visualising the connectivity within the Internet.  
<https://www.uni-due.de/~be0001/hipercontracer/>
- 2012 – ...**
- ✓ **NorNet Core Testbed**  
NORNET is a large-scale Internet research testbed for systems with multi-homing property (i.e. with simultaneous connections to multiple Internet server providers). NORNET CORE denotes its part for wired networks. This Linux-based software consists of a routing layer providing the multi-homing property to research experiments. The research experiments run in virtualised environments, either based on Linux Containers (LXC) or on full virtualisation (VirtualBox and KVM). These environments are hosted at about 20 sites that are distributed all over the world. Use cases for NORNET CORE include research on resilient systems and multi-path transport, particularly with Multi-Path TCP (MPTCP) and SCTP. NORNET CORE furthermore provides a management, monitoring and security infrastructure for the testbed.  
<https://www.mntb.no>
- 2009 – ...**
- ✓ **NetPerfMeter – A Network Performance Metering Tool**  
NETPERFMETER is a network performance meter for the UDP, TCP, MPTCP, SCTP and DCCP transport protocols over IPv4 and IPv6. It simultaneously transmits bidirectional flows to an endpoint and measures the resulting flow bandwidths and QoS. The results are written as vector and scalar files. The vector files can be used to create PDF plots of the results.  
<https://www.uni-due.de/~be0001/netperfmeter/>

## Open Source Software Projects (continued)

- 2009 – ...
- ✓ **Simulation Model of Concurrent Multipath Transfer for SCTP**  
Extensions of the existing SCTP simulation model in OMNET++'s INET Framework to Concurrent Multipath Transfer for SCTP (CMT-SCTP), including an application model for NETPERFMETER to allow for easy comparison between real network measurements and simulations. All extensions have been contributed into the upstream INET Framework project.  
<https://inet.omnetpp.org/>
- 2002 – ...
- ✓ **rsplib – Implementation of the Reliable Server Pooling Framework**  
RSPLIB is the Open Source implementation of the IETF's Reliable Server Pooling (RSerPool, RFC 5351) framework written in ANSI-C and C++, currently supporting Linux, FreeBSD, MacOS X and Solaris. Its intention is to validate the RSerPool drafts currently under standardization by the IETF and to verify results from my simulative research. As part of my RSerPool research in the context of my Ph.D. Thesis, multiple Internet Drafts have been contributed to the IETF's standardization process. Furthermore, the RSPLIB prototype has become the IETF RSerPool Working Group's reference implementation of RSerPool.  
<https://www.uni-due.de/~be0001/rserpool/>
- 2011 – ...
- ✓ **RTP Audio NextGen System**  
RTP Audio NextGen is an Open Source audio streaming system with support for SCTP as well as UDP transport. It is a highly advanced and reworked version of the former RTP Audio system with support for SCTP streams and SCTP partial reliability. Furthermore, it also contains a QoS management interface. RTP Audio NextGen may use layered encoding, i.e. the audio quality may be adapted according to QoS constraints. The main purpose of this tool is to support transport protocol and QoS research, by providing a realistic application for performance testing.  
<https://www.uni-due.de/~be0001/rtpaudio/>
- 2009 – ...
- ✓ **BibTeXConv – A BIB<sub>T</sub>E<sub>X</sub> File Converter**  
BibTeXConv is a BIB<sub>T</sub>E<sub>X</sub> file converter which allows to export BIB<sub>T</sub>E<sub>X</sub> entries to other formats, including customised text output. Furthermore, it provides the possibility to check URLs (including MD5, size and MIME type computations) and to verify ISBN and ISSN numbers.  
<https://www.uni-due.de/~be0001/bibtexconv/>
- 2007 – ...
- ✓ **SimProcTC – A Simulation Processing Tool-Chain for OMNET++**  
SimProcTC is a model-independent, flexible and powerful tool-chain for the setup, parallel run execution, results aggregation, data analysis and debugging of OMNET++-based simulations, using GNU R and other Open Source software under Linux. It optionally utilises the Reliable Server Pooling (RSerPool) implementation RSPLIB for easily setting up simulation processing pools for distributed execution of simulation runs.  
<https://www.uni-due.de/~be0001/omnetpp/>
- 2001 – ...
- ✓ **Socket API implementation for the SCTP Library sctplib**  
SCTPLIB is an Open Source userland implementation of the Stream Control Transmission Protocol (SCTP, RFC 4960). The Socket API – realized in C++ and ANSI-C – implements the Unix socket calls (e.g. bind(), connect(), setsockopt(), recvmsg(), ...) for this library. Both packages are multi-platform and support Linux, FreeBSD, MacOS X and Solaris. This project has been a cooperation between the University of Duisburg-Essen, Computer Networking Technology Group at the Institute for Experimental Mathematics and Siemens AG, Munich.  
<http://www.sctp.de/sctp.html>

## Open Source Software Projects (continued)

- 2003 – ...**
- ✓ **SlideShow – A Program to Create HTML Slideshows**  
SlideShow is a C++-based Open Source Linux application generating standards-compliant XHTML-1.1 presentations from a set of image files. It has been created to easily generate online photo albums, including JavaScript-based slideshows.  
<https://www.uni-due.de/~be0001/slideshow/>
- 2002 – ...**
- ✓ **SubNetCalc – An IPv4/IPv6 Subnet Address Calculator**  
SubNetCalc is a C++-based Open Source program to print various information about a given IPv4 or IPv6 address. It can also identify the address type and extract additional information from the address. Furthermore, it can be used to generate IPv6 Unique Local prefixes.  
<https://www.uni-due.de/~be0001/subnetcalc/>
- 2003**
- ✓ **Fractal Generator Project**  
FractalGenerator is a KDE-based Open Source program under Linux – written in C++ – to generate fractal images (e.g. the Mandelbrot set). The size of the calculated images is only limited by the computer's virtual memory. This program has been developed as an example for object-oriented programming and creating Qt/KDE applications for the University of Duisburg-Essen's Linux Workshop in 2003.  
<https://www.uni-due.de/~be0001/fractalgenerator/>
- 2000 – 2001**
- ✓ **RTP Trace System**  
An Open Source, Linux-based real-time network transmission test system using traces of various media types (MPEG 1/2, H.263, MP3, ...). It is realized in C++. This project is part of my Masters Thesis at the University of Bonn, Germany.  
[https://www.uni-due.de/~be0001/diplom/index\\_e.html](https://www.uni-due.de/~be0001/diplom/index_e.html)
- 1999 – 2001**
- ✓ **RTP Audio System**  
A Linux-based Open Source real-time network audio transmission system, supporting DiffServ, IPv6 and IPv6 flowlabels. Server and clients have been written in C++, a Java client is realized using JNI (Java Native Interface). The system has been a study project at the University of Bonn, Germany; my responsibility has been the implementation of the client/server transmission system itself, including the media codecs and the RTP protocol as well as the client GUI based on the Qt Toolkit.  
[https://www.uni-due.de/~be0001/rn/index\\_e.html](https://www.uni-due.de/~be0001/rn/index_e.html)
- 2000**
- ✓ **Prüfungsamt-Projekt – A Student and Exam Management Tool**  
A SQL-based, Open Source database application under Linux – written in C++, using the Qt GUI Toolkit and PostgreSQL – to simplify the work of the University's exams office (Prüfungsamt) using database transactions and triggers. It has been a study project at the University of Bonn, Germany; my responsibilities have been the GUI realization and the SQL trigger implementation.  
<https://www.uni-due.de/~be0001/rdbms/>

## Technical Competences

### Operating Systems

- ✓ AmigaOS (since 1988)
- ✓ AROS (since 1996)
- ✓ Cisco Internet Operating System (since 2001)
- ✓ FreeBSD (since 2001)
- ✓ IBM OS/2 Warp (since 1994)
- ✓ **Linux (since 1994)**
- ✓ Microsoft Windows/MS-DOS (since 1990)

### Programming Languages

- ✓ Assembler (Intel x86 since 1992, Motorola 680x0 since 1989)
- ✓ Basic (since 1989)

## Technical Competences (continued)

- ✓ Bash (since 1994)
- ✓ C (since 1989)
- ✓ C++ (since 1993)
- ✓ HTML (since 1996)
- ✓ Java (since 1997)
- ✓ JavaScript (since 2003)
- ✓ Python (since 2012)
- ✓ R (since 2004)
- ✓ SQL (PostgreSQL, MySQL, Oracle; since 2000)

### Software Experiences

- ✓ AmigaOS system programming (since 1988)
- ✓ Concurrent Versions System (CVS, since 2001)
- ✓ Git (since 2012)
- ✓ GNU Plot (since 1999)
- ✓ GNU Privacy Guard (GnuPG, since 2001)
- ✓ GNU R (since 2004)
- ✓ KDE Desktop programming (since 1998)
- ✓ Kernel-based Virtualisation (KVM, since 2012)
- ✓ L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> (since 2000)
- ✓ **Linux/Unix system and network programming (since 1994)**  
(threads, sockets, multicast, TCP/IP, SCTP, ...)
- ✓ Nessus (since 2001)
- ✓ **OMNeT++ Discrete Event Simulation Toolkit (since 2003)**
- ✓ OpenSSH (since 2001)
- ✓ PlanetLab (since 2005)
- ✓ PostgreSQL, MySQL, Oracle (since 2000)
- ✓ Qt GUI Toolkit programming (since 1996)
- ✓ Subversion (SVN, since 2004)
- ✓ VirtualBox (since 2012)
- ✓ Wireshark (since 2001)

### Network Technologies

- ✓ Internet Protocol, Version 6 (IPv6) (since 1999)
- ✓ **Multi-Path TCP (MPTCP, since 2012)**
- ✓ Real-Time Transport Protocol (RTP), IntServ/DiffServ (since 1999)
- ✓ **Reliable Server Pooling (RSerPool, since 2002)**
- ✓ **Stream Control Transmission Protocol (SCTP, since 2001)**
- ✓ **TCP/IP (since 1996)**
- ✓ Transport Layer Security (TLS, since 2001)

## Publications

### Books

2012

- ✓ T. Dreibholz: “[Evaluation and Optimisation of Multi-Path Transport using the Stream Control Transmission Protocol](#)”, Habilitation Treatise, University of Duisburg-Essen, Faculty of Economics, Institute for Computer Science and Business Information Systems, URN [urn:nbn:de:hbz:464-20120315-103208-1](https://nbn-resolving.org/urn:nbn:de:hbz:464-20120315-103208-1), March 13, 2012.

2007

- ✓ T. Dreibholz: “[Reliable Server Pooling – Evaluation, Optimization and Extension of a Novel IETF Architecture](#)”, Ph.D. Dissertation, University of Duisburg-Essen, Faculty of Economics, Institute for Computer Science and Business Information Systems, URN [urn:nbn:de:hbz:465-20070308-164527-0](https://nbn-resolving.org/urn:nbn:de:hbz:465-20070308-164527-0), March 7, 2007. **Awarded with the Science Award of the Sparkasse Essen.**



## Publications (continued)

- 2001 ✓ T. Dreibholz: “Management of Layered Variable Bitrate Multimedia Streams over DiffServ with Apriori Knowledge”, Masters Thesis, University of Bonn, Institute for Computer Science, URN [urn:nbn:de:hbz:464-20120416-095753-8](https://nbn-resolving.org/urn:nbn:de:hbz:464-20120416-095753-8), February 20, 2001.

### Refereed Journal Publications

- 2020 ✓ R. Barik, M. Welzl, G. Fairhurst, T. Dreibholz, A. M. Elmokashfi and S. Gjessing: “On the Usability of Transport Protocols other than TCP: A Home Gateway and Internet Path Traversal Study”, in *Computer Networks*, vol. 173, Elsevier, DOI [10.1016/j.comnet.2020.107211](https://doi.org/10.1016/j.comnet.2020.107211), ISSN 1389-1286, May 22, 2020.
- 2019 ✓ R. Barik, M. Welzl, A. M. Elmokashfi, T. Dreibholz, S. Islam and S. Gjessing: “On the Utility of Unregulated IP DiffServ Code Point (DSCP) Usage by End Systems”, in *Performance Evaluation*, vol. 135, Elsevier, DOI [10.1016/j.peva.2019.102036](https://doi.org/10.1016/j.peva.2019.102036), ISSN 0166-5316, August 26, 2019.
- 2016 ✓ K. V. Yedugundla, S. Ferlin, T. Dreibholz, Ö. Alay, N. Kuhn, P. Hurtig and A. Brunström: “Is Multi-Path Transport Suitable for Latency Sensitive Traffic?”, in *Computer Networks*, vol. 105, pp. 1–21, Elsevier, DOI [10.1016/j.comnet.2016.05.008](https://doi.org/10.1016/j.comnet.2016.05.008), ISSN 1389-1286, August 4, 2016.
- 2014 ✓ E. G. Gran, T. Dreibholz and A. Kvalbein: “NorNet Core – A Multi-Homed Research Testbed”, in *Computer Networks, Special Issue on Future Internet Testbeds*, vol. 61, pp. 75–87, DOI [10.1016/j.bjp.2013.12.035](https://doi.org/10.1016/j.bjp.2013.12.035), ISSN 1389-1286, March 14, 2014.
- 2011 ✓ T. Dreibholz, I. Rüngeler, R. Seggelmann, M. Tüxen, E. P. Rathgeb and R. R. Stewart: “Stream Control Transmission Protocol: Past, Current, and Future Standardization Activities”, in *IEEE Communications Magazine*, vol. 49, no. 4, pp. 82–88, DOI [10.1109/MCOM.2011.5741151](https://doi.org/10.1109/MCOM.2011.5741151), ISSN 0163-6804, April 5, 2011.
- 2010 ✓ T. Dreibholz, X. Zhou, M. Becke, J. Pulinthanath, E. P. Rathgeb and W. Du: “On the Security of Reliable Server Pooling Systems”, in *International Journal on Intelligent Information and Database Systems (IJIIDS)*, vol. 4, no. 6, pp. 552–578, DOI [10.1504/IJIIDS.2010.036894](https://doi.org/10.1504/IJIIDS.2010.036894), ISSN 1751-5858, December 2010.
- 2009 ✓ T. Dreibholz and E. P. Rathgeb: “Overview and Evaluation of the Server Redundancy and Session Failover Mechanisms in the Reliable Server Pooling Framework”, in *International Journal on Advances in Internet Technology (IJAIT)*, vol. 2, no. 1, pp. 1–14, ISSN 1942-2652, June 8, 2009.
- ✓ W. Zhu, T. Dreibholz, E. P. Rathgeb and X. Zhou: “A Scalable QoS Device for Broadband Access to Multimedia Services”, in *SERSC International Journal of Multimedia and Ubiquitous Engineering (IJMUE)*, vol. 4, no. 2, pp. 157–172, ISSN 1975-0080, April 30, 2009.
- 2008 ✓ T. Dreibholz and E. P. Rathgeb: “An Evaluation of the Pool Maintenance Overhead in Reliable Server Pooling Systems”, in *SERSC International Journal on Hybrid Information Technology (IJHIT)*, vol. 1, no. 2, pp. 17–32, ISSN 1738-9968, April 2008.



## Publications (continued)

### Refereed Conference Publications

2020

- ✓ M. Chen, T. Dreibholz, X. Zhou and X. Yang: “[Improvement and Implementation of a Multi-Path Management Algorithm Based on MPTCP](#)”, in *Proceedings of the 45th IEEE Conference on Local Computer Networks (LCN)*, Sydney, New South Wales/Australia, November 16, 2020.
- ✓ T. Dreibholz: “[HiPerConTracer - A Versatile Tool for IP Connectivity Tracing in Multi-Path Setups](#)”, in *Proceedings of the 28th IEEE International Conference on Software, Telecommunications and Computer Networks (SoftCOM)*, DOI [10.23919/SoftCOM50211.2020.9238278](#), ISBN 978-953-290-099-6, Hvar, Dalmacija/Croatia, September 17, 2020.
- ✓ I. A. Livadariu, T. Dreibholz, A. S. Al-Selwi, H. Bryhni, O. Lysne, S. Bjørnstad and A. M. Elmokashfi: “[On the Accuracy of Country-Level IP Geolocation](#)”, in *Proceedings of the ACM/IRTF Applied Networking Research Workshop (ARNW)*, pp. 67–73, DOI [10.1145/3404868.3406664](#), ISBN 978-1-4503-8039-3, Madrid/Spain, July 27, 2020.
- ✓ P. Saxena, T. Dreibholz, H. Skinnemoen, Ö. Alay, Á. Vazquez-Castro, S. Ferlin and G. Acar: “[Resilient Hybrid SatCom and Terrestrial Networking for Unmanned Aerial Vehicles](#)”, in *Proceedings of the 39th IEEE International Conference on Computer Communications (INFOCOM), International Workshop on Wireless Sensor, Robot and UAV Networks (WiSARN)*, DOI [10.1109/INFOCOMWKSHP50562.2020.9162943](#), ISBN 978-1-7281-8696-2, Toronto, Ontario/Canada, July 6, 2020.
- ✓ M. Xie, J. S. Pujol-Roig, F. Michelinakis, T. Dreibholz, C. Guerrero, A. G. Sánchez, W. Y. Poe, Y. Wang and A. M. Elmokashfi: “[AI-Driven Closed-Loop Service Assurance with Service Exposures](#)”, in *Proceedings of the 29th IEEE European Conference on Networks and Communications (EuCNC)*, DOI [10.1109/EuCNC48522.2020.9200943](#), ISBN 978-1-7281-4355-2, Dubrovnik, Dubrovnik-Neretva/Croatia, June 17, 2020.
- ✓ T. Dreibholz: “[Flexible 4G/5G Testbed Setup for Mobile Edge Computing using OpenAirInterface and Open Source MANO](#)”, in *Proceedings of the 2nd International Workshop on Recent Advances for Multi-Clouds and Mobile Edge Computing (M2EC) in conjunction with the 34th International Conference on Advanced Information Networking and Applications (AINA)*, pp. 1143–1153, DOI [10.1007/978-3-030-44038-1\\_105](#), ISBN 978-3-030-44037-4, Caserta, Campania/Italy, April 15, 2020.

2019

- ✓ Y. Luo, X. Zhou, T. Dreibholz and H. Kuang: “[A Real-Time Video Streaming System over IPv6+MPTCP Technology](#)”, in *Proceedings of the 1st International Workshop on Recent Advances for Multi-Clouds and Mobile Edge Computing (M2EC) in conjunction with the 33rd International Conference on Advanced Information Networking and Applications (AINA)*, pp. 1007–1019, DOI [10.1007/978-3-030-15035-8\\_99](#), ISBN 978-3-030-15034-1, Matsue, Shimane/Japan, March 27, 2019.
- ✓ J. Hong, T. Dreibholz, J. A. Schenkel and J. A. Hu: “[An Overview of Multi-Cloud Computing](#)”, in *Proceedings of the 1st International Workshop on Recent Advances for Multi-Clouds and Mobile Edge Computing (M2EC) in conjunction with the 33rd International Conference on Advanced Information Networking and Applications (AINA)*, pp. 1055–1068, DOI [10.1007/978-3-030-15035-8\\_103](#), ISBN 978-3-030-15034-1, Matsue, Shimane/Japan, March 27, 2019.

## Publications (continued)

- ✓ T. Dreibholz, S. Mazumdar, F. Zahid, A. Taherkordi and E. G. Gran: “[Mobile Edge as Part of the Multi-Cloud Ecosystem: A Performance Study](#)”, in *Proceedings of the 27th Euromicro International Conference on Parallel, Distributed and Network-Based Processing (PDP)*, pp. 59–66, DOI [10.1109/EMPDP.2019.8671599](#), ISBN 978-1-7281-1644-0, Pavia, Lombardia/Italy, February 13, 2019.
- 2018**
- ✓ Q. Tan, X. Yang, L. Zhao, X. Zhou and T. Dreibholz: “[A Statistic Procedure to Find Formulae for Buffer Size in MPTCP](#)”, in *Proceedings of the 3rd IEEE Advanced Information Technology, Electronic and Automation Control Conference (IAEAC)*, pp. 900–907, DOI [10.1109/IAEAC.2018.8577570](#), ISBN 978-1-5386-4509-3, Chongqing/People’s Republic of China, October 13, 2018.
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### Refereed Poster and Demonstration Presentations

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  - ✓ A. F. Ocampo, T. Dreibholz, M. Fida, A. M. Elmokashfi and H. Bryhni: “[Integrating Cloud-RAN with Packet Core as VNF Using Open Source MANO and OpenAirInterface](#)”, in *Proceedings of the 45th IEEE Conference on Local Computer Networks (LCN)*, Sydney, New South Wales/Australia, November 18, 2020.
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- 2014** ✓ T. Dreibholz, H. V. Simonsen and E. G. Gran: “[A Demonstration of the NorNet Core Research Testbed for Multi-Homed Systems](#)”, Demo Presentation at the IEEE Global Communications Conference (GLOBECOM), Austin, Texas/U.S.A., December 9, 2014.
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- 2007** ✓ T. Dreibholz and E. P. Rathgeb: “[Towards the Future Internet – A Survey of Challenges and Solutions in Research and Standardization](#)”, in *Proceedings of the 7th Joint EuroFGI and ITG Workshop on Visions of Future Network Generations (EuroView)*, Poster Presentation, Würzburg, Bayern/Germany, July 23, 2007.
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- 2019** ✓ A. M. Elmokashfi, A. Kvalbein, T. Dreibholz and C. Jarvis: “[Norske mobilnett i 2018 – Tilstandsrapport fra Centre for Resilient Networks and Applications](#)”, Simula Metropolitan Center for Digital Engineering, Centre for Resilient Networks and Applications (CRNA), ISBN 978-82-92593-25-7, Oslo/Norway, May 29, 2019.
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- 2000 ✓ T. Dreibholz, J. Selzer and S. Vey: “[Echtzeit-Audioübertragung mit QoS-Management in einem DiffServ-Szenario](#)”, Universität Bonn, Institut für Informatik, August 14, 2000.

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- 2020 ✓ T. Dreibholz: “[Custom-Made Enhanced Packet Cores as Network Services for 4G/5G Testbeds managed with Open Source MANO](#)”, Presentation at the Mosaic5G Workshop, December 3, 2020.
- ✓ T. Dreibholz and A. F. Ocampo: “[Managing Tailor-Made Enhanced Packet Cores for 4G/5G Testbeds in OSM with the SimulaMet OpenAirInterface VNF](#)”, Presentation at the OSM Hackfest, December 2, 2020.
- ✓ T. Dreibholz: “
- 2019 ✓ T. Dreibholz: “[MELODIC at Hainan University: Combining NorNet Core with MELODIC](#)”, Invited Talk at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, April 18, 2019.
- ✓ T. Dreibholz: “[MELODIC at Hainan University: An Introduction to the MELODIC Project](#)”, Keynote Talk at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, April 17, 2019.
- ✓ T. Dreibholz: “[NorNet at Hainan University: Getting Started with NorNet Core](#)”, Tutorial at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, April 16, 2019.
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- ✓ T. Dreibholz: “[NEAT Tutorial at Hainan University: Getting Started with NEAT](#)”, Invited Talk at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, December 18, 2017.
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- ✓ T. Dreibholz: “[The Basics of Using the NorNet Core Testbed at Hainan University](#)”, Tutorial at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, April 18, 2017.
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- ✓ T. Dreibholz: “[An Experiment Tutorial for the NorNet Core Testbed at the the Universidad de Castilla-La Mancha](#)”, Tutorial at the Universidad de Castilla-La Mancha, Instituto de Investigación Informática de Albacete, Albacete, Castilla-La Mancha/Spain, February 16, 2017.
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- ✓ T. Dreibholz: “[NorNet – The Internet Testbed for Multi-Homed Systems](#)”, in *Proceedings of the Multi-Service Networks Conference (MSN, Coseners)*, Abingdon, Oxfordshire/United Kingdom, July 8, 2016.
  - ✓ T. Dreibholz: “[NorNet at the Haikou College of Economics – An Introduction to the NorNet Testbed](#)”, Invited Talk at the Haikou College of Economics, Guilinyang, Hainan/People’s Republic of China, June 6, 2016.
  - ✓ T. Dreibholz: “[An Experiment Tutorial for the NorNet Core Testbed at Hainan University](#)”, Tutorial at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, May 29, 2016.
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  - ✓ T. Dreibholz: “[An Experiment Tutorial for the NorNet Core Testbed at HAW Hamburg](#)”, Tutorial at Hochschule für Angewandte Wissenschaften Hamburg (HAW Hamburg), Hamburg/Germany, March 22, 2016.
  - ✓ T. Dreibholz: “[NorNet at HAW Hamburg – An Introduction to the NorNet Testbed](#)”, Invited Talk at Hochschule für Angewandte Wissenschaften Hamburg (HAW Hamburg), Hamburg/Germany, March 22, 2016.
  - ✓ T. Dreibholz: “[An Experiment Tutorial for the NorNet Core Testbed at NICTA](#)”, Tutorial at National Information Communications Technology Australia (NICTA), Sydney, New South Wales/Australia, January 22, 2016.
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  - ✓ T. Dreibholz: “[The NorNet Testbed: A Platform for Evaluating Multi-Path Transport in the Real-World Internet](#)”, in *Proceedings of the 87th IETF Meeting*, Berlin/Germany, July 30, 2013.
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  - ✓ T. Dreibholz: “[The NorNet Project – An Introduction to NorNet for the Site Deployment at NTNU Trondheim](#)”, Invited Talk at Norges teknisk-naturvitenskapelige universitet (NTNU), Trondheim, Sør-Trøndelag/Norway, April 12, 2013.
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  - ✓ T. Dreibholz: “[The NorNet Project – A Research Testbed for Multi-Homed Systems](#)”, Invited Talk at Karlstads Universitet, Karlstad, Värmland/Sweden, November 2, 2012.
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- 2011**
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- 2010**
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- 2008** ✓ T. Dreibholz and X. Zhou: “[SCTP and RSerPool: Architectures and Protocols for the Future Internet](#)”, Invited Talk at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, September 26, 2008.
- 2007** ✓ T. Dreibholz: “[An Introduction to Reliable Server Pooling and the RSPLIB Implementation](#)”, Invited Talk at Hainan University, College of Information Science and Technology (CIST), Haikou, Hainan/People’s Republic of China, December 2, 2007.
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- 2005** ✓ T. Dreibholz: “[draft-ietf-rserpool-mib-01.txt – Management Information Base Definition for Reliable Server Pooling](#)”, in *Proceedings of the 63rd IETF Meeting*, Paris/France, August 1, 2005.
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### **ietf Internet Drafts**

- 2020** ✓ T. Dreibholz: “[An IPv4 Flowlabel Option](#)”, Internet Draft draft-dreibholz-ipv4-flowlabel-32, IETF, Individual Submission, September 9, 2020.
- ✓ T. Dreibholz: “[Applicability of Reliable Server Pooling for Real-Time Distributed Computing](#)”, Internet Draft draft-dreibholz-rserpool-applic-distcomp-29, IETF, Individual Submission, September 9, 2020.
- ✓ T. Dreibholz and J. Pulinthanath: “[Applicability of Reliable Server Pooling for SCTP-Based Endpoint Mobility](#)”, Internet Draft draft-dreibholz-rserpool-applic-mobility-28, IETF, Individual Submission, September 9, 2020.

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  - ✓ T. Dreibholz: “[Handle Resolution Option for ASAP](#)”, Internet Draft draft-dreibholz-rserpool-asap-hropt-27, IETF, Individual Submission, September 9, 2020.
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