

IP Multicast im Internet - MBone



Westfälische
Wilhelms-Universität
Münster

Guido Wessendorf
Universitätsrechenzentrum



Guido Wessendorf / Rechenzentrum Universität Münster



Agenda

- Der MBone
- IP-Multicast Anwendungen im MBone
- MBone an der WWU Münster

Datum: 10./11.02.1998

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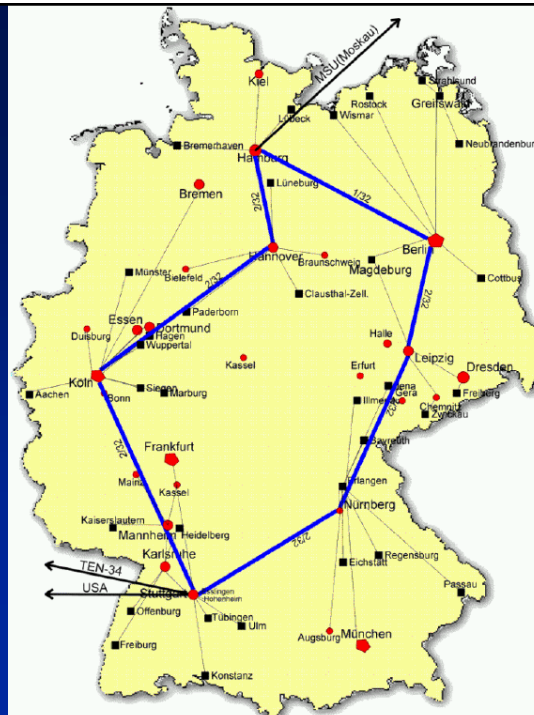


IP Multicast - Historie

- Grundlegende Arbeiten u.a. von Steve Deering Ende der 80er Jahre
- 1992
 - Erste IETF-Experimente zur multimedialen Übertragung der IETF-Meetings
 - Start des MBone als virtuelles Multicast-Overlaynetz auf dem bestehenden Internet
 - Etwa 40 Subnetze in 4 Ländern
- 1997
 - Ca. 5000 (Sub-)Netze weltweit verteilt im Internet

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MBone-DE

- ~ 66 Teilnehmer
- Zumeist B-WiN-Anschluß:
34/155 Mbit/s ATM
- I.d.R. 1-4 MBit/s
Rate-Limit

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IP Multicast - Anwendungen

Video Conferencing Training Video-On-Demand

Games

Multicast File Transfer
Data and File Replication Simulations

Resource Discovery Live TV and Radio Broadcast
to the Desktop

Corporate Broadcasts Real-Time Data Delivery-Financial

Whiteboard/Collaboration

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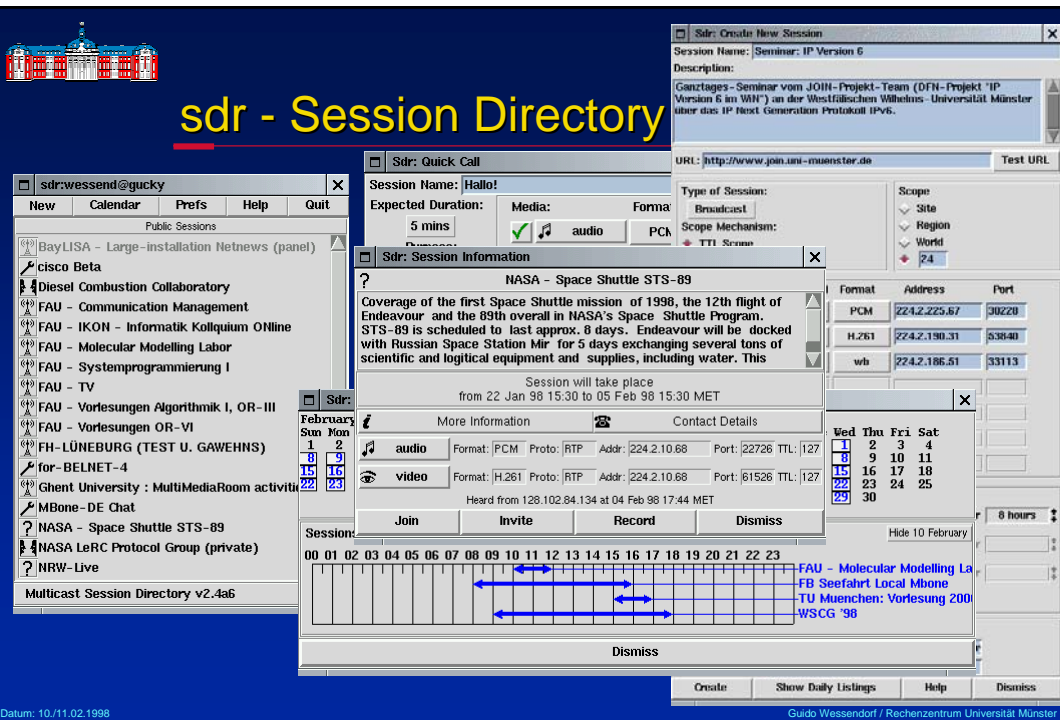


Frei verfügbare MBone-Software

- Weit verbreitet und angewendet
- Für viele Betriebssysteme verfügbar
- MBone-Tools, u.a.
 - sdr - Session Directory
 - vat - Audio (rat, fphone)
 - vic - Video
 - wb - Whiteboard
 - nt - Text

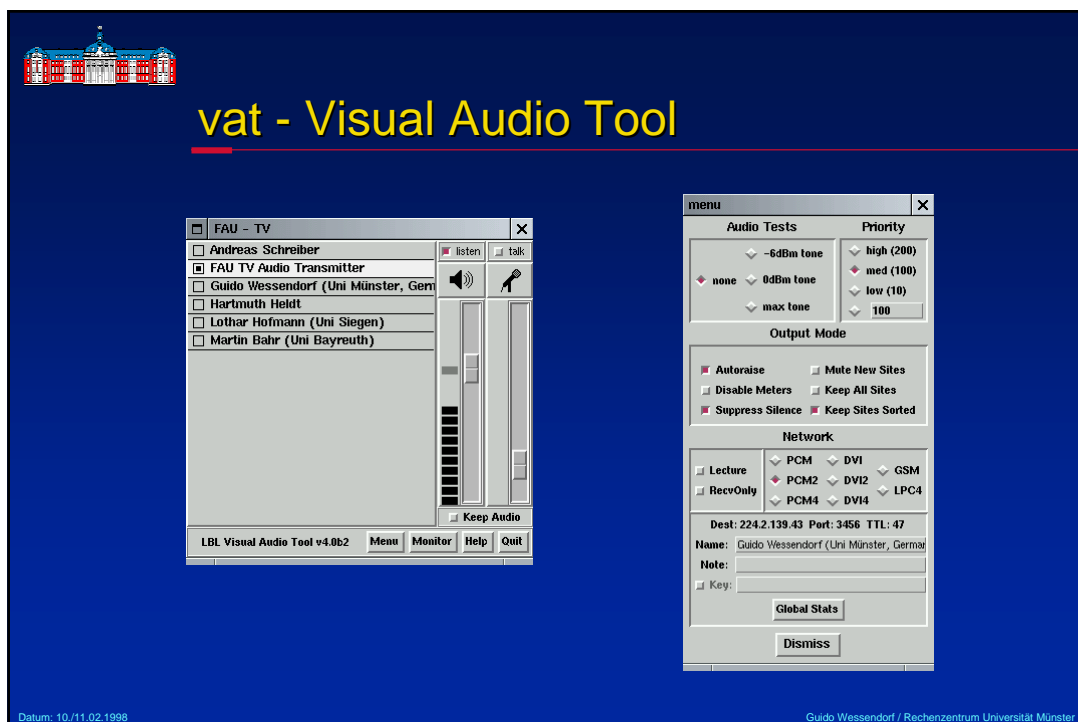
Datum: 10./11.02.1998

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sdr - Session Directory

The screenshot shows the 'sdr - Session Directory' application interface. It features a main window with a menu bar (New, Calendar, Prefs, Help, Quit) and a toolbar. The left pane lists 'Public Sessions' including BayLISA, cisco Beta, Diesel Combustion Collaboratory, FAU - Communication Management, FAU - IKON, FAU - Molecular Modelling Labor, FAU - Systemprogrammierung I, FAU - TV, FAU - Vorlesungen Algorithmik I, OR-III, FAU - Vorlesungen OR-VI, FH-LÜNEBURG (TEST U. GAWEHNS), for-BELNET-4, Ghent University: MultiMediaRoom activiti, MBone-DE Chat, NASA - Space Shuttle STS-89, NASA LERC Protocol Group (private), and NRW-Live. The main pane displays details for the 'NASA - Space Shuttle STS-89' session, including a description, session duration (5 mins), media (audio), and format (PCM). It also shows a calendar view for February 1998 and a list of session participants. The bottom status bar indicates the date 'Datum: 10./11.02.1998' and the user 'Guido Wessendorf / Rechenzentrum Universität Münster'.



vat - Visual Audio Tool

The screenshot shows the 'vat - Visual Audio Tool' application interface. It features a main window with a menu bar (Menu, Monitor, Help, Quit) and a toolbar. The left pane lists 'FAU - TV' sessions, including Andreas Schreiber, FAU TV Audio Transmitter, Guido Wessendorf (Uni Münster, Ger), Hartmuth Heldt, Lothar Hofmann (Uni Siegen), and Martin Bahr (Uni Bayreuth). The main pane displays a list of session participants and a 'Keep Audio' checkbox. The right pane shows the 'menu' settings, including Audio Tests (none, 0dBm tone, max tone), Output Mode (Autoraize, Mute New Sites, Disable Meters, Keep All Sites, Suppress Silence, Keep Sites Sorted), Network (Lecture, RecvOnly, PCM, DVI, GSM, DVI2, LPC4, DVI4), and Dest: 224.2.139.43 Port: 3456 TTL: 47. The bottom status bar indicates the date 'Datum: 10./11.02.1998' and the user 'Guido Wessendorf / Rechenzentrum Universität Münster'.



vic - Video Conferencing Tool

Places all over the world

Vince Fuller (BBN Planet)
Palo Alto Baylands
1.1 f/s 9 kb/s (14%)
mute color info...

Juergen Weigert (FAU Erlangen immd4)
juw@131.188.34.135/h261
2.0 f/s 5 kb/s (0%)
mute color info...

UWM Parking lot #6
Milwaukee, WI USA
0 f/s 8 bps (24%)
mute color info...

Tom Perrine - SDSU
tep@132.249.40.111/h261
0.4 f/s 7 kb/s (53%)
mute color info...

Guido Wessendorf (Uni Münster, Germany)
Guido Wessendorf@128.176.0.50/h261
0.3 f/s 15 kb/s (0%)
mute color info...

VIC v2.8 Menu Monitor Help Quit



vic:vic menu

Transmission

Transmit Release

Rate Control 0.0 f/s 0.0 kb/s
128 kbps
8 fps

Encoder

Device... nv ipeg
Port... nvdc h261
Options... cellb bvc
small normal large

Quality 10

Display

Options... Ordered Quantize
Tile... Error Diff Gray
External Gamma: 0.7 [16-bit]

Session

Dest: 224.2.172.238 Port: 51482 ID: 596121575 TTL: 127
Name: Guido Wessendorf (Uni Münster, Germany)
Note:
Key:
Global Stats Members
Dismiss

Datum: 10./11.02.1998

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wb - Shared Whiteboard

@JOIN

Activity

Guido Löffler (Uni Münster, Germany)
sand@bully.join.uni-muenster.de
Guido Wessendorf (Uni Münster, Germany)

Participants

Guido Löffler (Uni Münster, Germany)
Guido Wessendorf (Uni Münster, Germany)
sand@bully.join.uni-muenster.de

Participant Info

Network

Dest: 224.2.230.66 Port: 46314 ID: 0 TTL: 15
Name: Guido Wessendorf (Uni Münster, Germany)
Key: (not encrypted)
Title: JOIN
Point to type Mute New Sites
Smooth Lines Receive Only

JOIN

```
# $Id: mrouted.conf,v 3.8 1995/11/29 22:40:47 fenner Rel $
#
# This is the configuration file for "mrouted", an IP multicast router.
# mrouted looks for it in "/etc/mrouted.conf".
#
# Command formats:
#
# # name <boundary> <scoped-addr>/<mask-len>
# # cache_lifetime 3600 # seconds
# # pruning on
# # phyint <local-addr> [disable] [metric <m>] [threshold <t>] [rate_limit <b>]
# # [boundary <boundaryname> <scoped-addr>/<mask-len>]
# # [altnet <subnet>/<mask-len> <subnet>]
# # tunnel <local-addr> <remote-addr> [srort] [metric <m>]
# # [threshold <t>] [rate_limit <b>]
# # [boundary <boundaryname> <scoped-addr>/<mask-len>]
#
# NOTE: any phyint commands MUST precede any tunnel commands
# NOTE: the mask-len is the no. of leading 1's in the mask
# NOTE: rate_limit is in kilobits, and defaults to 500 for tunnels
#
# Example of named boundary:
# #name LOCAL 239.255.0.0/16
# #name EE 239.254.0.0/16 # i.e. the EE dept wants local groups
#
# Example of use of named boundary
# #phyint le1 boundary EE # le1 is our place to comp sci,
# # keep them away from our local groups
#
# phyint eth0
# # phyint dummy
#
```

das ist ja prima

ach

Was sollen diese blauen Pfeile ??

Billy Boy hat in Brüssel ne Torte ins Gesicht gekriegt :)

LB.L ub 1.59

Font Brush Undo Print Quit

Blank Page Import PS Import Text Guido:4

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nt - Network Text Editor

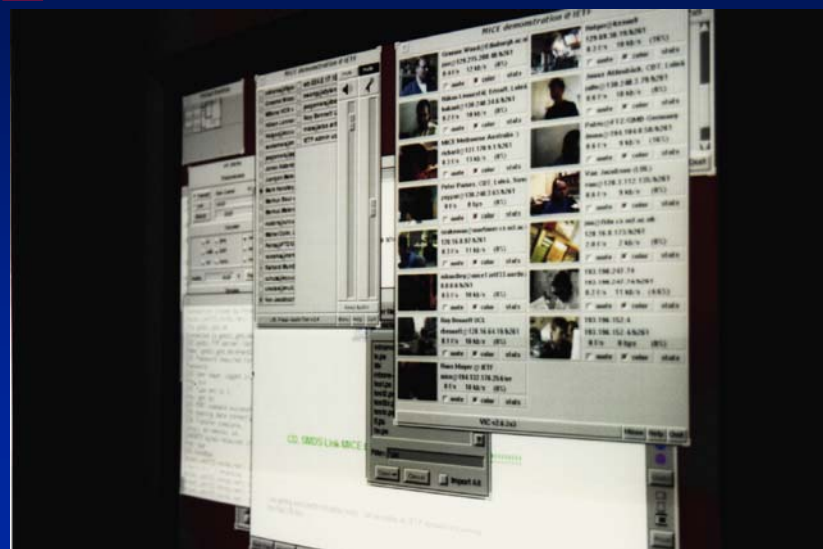
```
# $Id: routed.conf,v 3.8 1995/11/29 22:40:47 ferner Rel $
#
# This is the configuration file for "routed", an IP multicast router.
# routed looks for it in "/etc/routed.conf".
#
# Command formats:
#
# name <boundname> <scoped-addr>/<mask-len>
# cache_lifetime 3600 # seconds
# pruning on
#
# phyint <local-addr> [disable] [metric <m>] [threshold <t>] [rate_limit <b>]
# [boundary <boundname>|<scoped-addr>/<mask-len>]]
# [altnet (<subnet>/<mask-len>|<subnet>)]
# tunnel <local-addr> <remote-addr> [secret] [metric <m>]
# [threshold <t>] [rate_limit <b>]
# [boundary <boundname>|<scoped-addr>/<mask-len>]]
#
# NOTE: any phyint commands MUST precede any tunnel commands
# NOTE: the mask-len is the no. of leading 1's in the mask
# NOTE: rate_limit is in kilobits, and defaults to 500 for tunnels
#
# Example of named boundary:
# name LOCAL 239.255.0.0/16
# name EE 239.254.0.0/16
# # i.e. the EE dept wants local groups
#
# Example of use of named boundary
# phyint le1 boundary EE # le1 is our interface to comp sci.
# # keep them away from our local groups
#
# phyint eth0
# phyint dummy
#
# Template tunnel for mcast install
# tunnel 128.4.0.77 128.4.0.8 metric 1 threshold 64 rate_limit 500 # <-- REPLACE
# boundary LOCAL
# tunnel 128.176.0.50 128.176.188.132 metric 1 threshold 1 rate_limit 0 (in LAN ok)
#
# You might want to specify a boundary on your tunnel to the outside world,
# as above.
#
# NOTE: ONLY uncomment the following if you are running routed span!
```

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Der Monitor ist immer zu klein ...



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Multimedia-Tag NRW '97

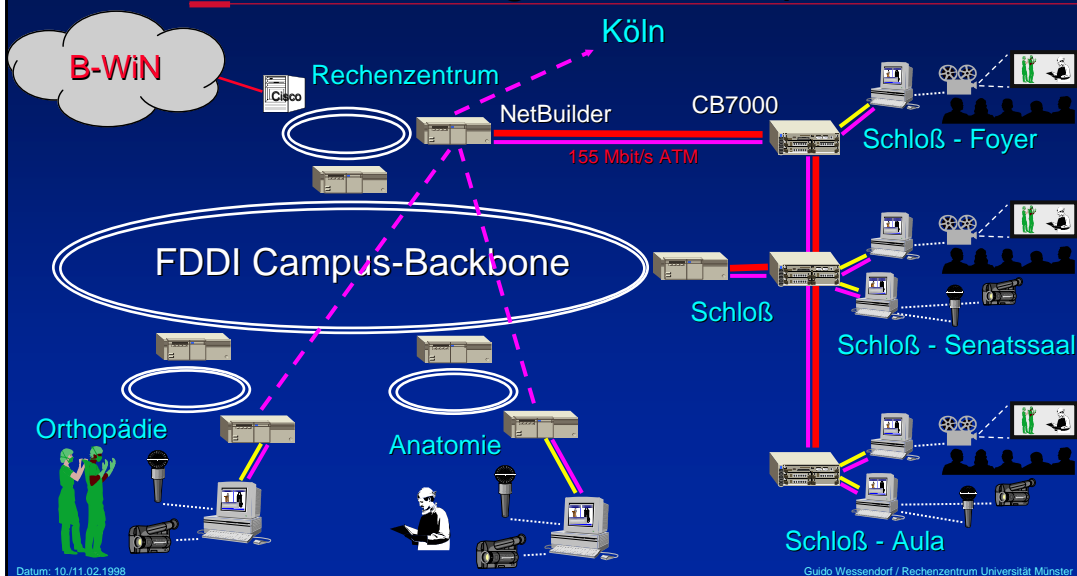
- 12 Universitäten in NRW demonstrierten erfolgreich landesweite multimediale Übertragungen
- Medium: Multicast-IP (MBone) in NRW (B-WiN)
- MBone-Applikationen: sdr, vic, vat, wb
- Folgende Szenarien erprobt:
 - MBone-Empfang an einzelnen Arbeitsplätzen
 - MBone-Empfang mit Projektoren in Hörsälen
 - Senden in den MBone
- Zusätzlich in Münster: Demo eines interdisziplinären Online-Unterrichts: Live-Operation am Knie ...

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MultiMedia-Tag NRW, Setup Münster



Datum: 10./11.02.1998

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Ausblick

- Entwicklungen noch im Fluß
- Multicast als Dienst der Provider ?
 - Zunächst im Forschungsumfeld (B-WiN)
 - WWU Münster
 - US-Provider (MCI, BBNPlanet, Sprint, ...)
- DVMRP / MOSPF / PIM-DM / PIM-SM / CBT ?
- RSVP
- IPv6

Referenz: <http://www.mbone.de>