Connectivity Fäscht
Our *networking event* 😊

You will need to find each other, so please:

- Sit in the assigned part of the room for your AS
- Take a colored sign for your AS.

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Introduction
I’m going to tell you:

- **Where you should be**
  Which parts of question 1 & 2 you need to solve to participate

- **What you are going to do**
  And the most important tools to help you

- **How to solve common problems**
  With BGP, some things can be tricky.
Where you should be
You need internal connectivity and a full iBGP mesh.

- **Must-have: Question 1.2**
  All routers must be able to reach each other: they need IP addresses and OSPF must be configured
  
  *Test: ping each router from each other router.*

- **Must-have: Question 2.1**
  All router need iBGP session with each other: you need a full mesh not just with physical neighbors also, some properties need to be configured
  
  *Test: show ip bgp summary*
Where you should be
You need 56 iBGP sessions!

from each router

ZURI
BERN
LUCE
BASE
GENE
LAUS
LUGA
STGA

to each other router

ZURI
BERN
LUCE
BASE
GENE
LAUS
LUGA
STGA
What you are going to do
Establish eBGP sessions with each other and configure BGP

- Go to `duvel.ethz.ch/as-connections` and enter your AS number in the filter.
- This page shows your neighbors and subnets to use. It also shows business relations, which will be important in the following questions.
- You will need to find the students managing other ASes. Discuss which IP address each of you are using in the subnet such that you can establish a session.
- For TA-managed ASes, use the provided IP address.
What you are going to do
duvel.ethz.ch/matrix will show the current mini–Internet connectivity
What you are going to do
There are several useful tools for debugging BGP.

On your own devices

- **show ip bgp summary**
  BGP neighbors and session status
- **show ip bgp**
  Routes learned with BGP with the AS path
- **show ip bgp neighbor X.X.X.X routes**
  Routes received from X.X.X.X
- **show ip bgp neighbor X.X.X.X advertised-routes**
  Routes advertised to X.X.X.X

For other ASes

- Go to **duvel.ethz.ch/looking-glass**
  This shows the output of `show ip bgp` for a given AS and router
- Can help you understand how other ASes reach you
- The looking-glass also contains a **Policy Analyzer** showing some common mistakes
How to solve common problems

- iBGP & update-source
- eBGP & next-hop-self
- Quick intro to Business relationships
  More details in the next lecture.
How to solve common problems

iBGP sessions should use the loopback interface

- Each router is available over multiple paths. If one link fails, the iBGP session should remain active.

- Thus, do not establish sessions with the address of a particular interface.

- Instead, use the loopback interface which remains up as long as the router works.

- When configuring the session, use:
  neighbor X.X.X.X update-source lo

- Only for iBGP
  The loopback address should only be reachable internally!
How to solve common problems
border routers must use next-hop-self for their iBGP sessions

- **The situation:**
  R1 announces prefix for AS 200 to R2
  “You can reach AS 200 with next hop 10.0.0.2”
  R2 propagates this announcement to R3 via iBGP.
  *Unchanged!*

- **The problem:**
  R3 does not know how to reach 10.0.0.2; only R2 does!

- **The solution:**
  When configuring the iBGP session on R2, use:
  neighbor X.X.X.X next-hop-self

- **The result:**
  R2 propagates the announcement from R1 as:
  "You can reach AS 200 with next hop <loopback address of R2>"
How to solve common problems
a primer on business relationships.

- You have learned about local-pref in the lecture. But why would you prefer some announcements?
- The answer is money. More in the lecture, but I’ll cover the basics now.
- Required for question 2.3 and following.
How to solve common problems

Customers pay providers for access.

- The mini-Internet is free; in the real world you have to pay.
- You pay your providers for access.
  For all traffic exchanged with a provider, you pay.
- Similarly, your customers pay you for access.
  For all traffic exchanged with a customer, you earn.
- Consequently, you have preferences.
  Never send traffic from provider to provider.
  If there are multiple paths, prefer your customers.
- How?
  By filtering advertisements and using local-pref.
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How to solve common problems
Peers exchange traffic for free out of common interest.

Two customers exchange traffic. Three scenarios:

No peering
"Peers" earn from customers.
Both pay the provider.

Good peering
Peers exchange traffic for free.
Avoid provider, thus earn more.

Bad peering
Peers use you to exchange traffic.
You have to do work, but earn nothing.
Do not allow this!
How to solve common problems
How can you impact inbound and outbound traffic?

- **Outgoing traffic** is determined by which incoming advertisements you select (route-map in)
  
  *If you deny an advertisement, you cannot use that path.*

  *For multiple paths, use local-pref to select the best.*

- **Incoming traffic** is determined by which selected advertisements you send out (route-map out)
  
  *If you deny, others cannot use this path via your AS.*

  *Remember that only the selected advertisements are considered.*
# How to solve common problems

## Cheat sheet

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<thead>
<tr>
<th>import</th>
<th>local-pref</th>
<th>export</th>
<th>customer</th>
<th>peer</th>
<th>provider</th>
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<td>✅</td>
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<td>provider</td>
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