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Technical Requirements for Smooth Virtual Events

Audio and video transmission is based on **WebRTC**.

WebRTC (Web Real-Time Communications) is a forward-looking open standard from the W3C that enables real-time communication directly through web browsers without requiring additional software or plug-ins.

Low latency and peer-to-peer connections via HTTPS make it highly efficient and secure against eavesdropping.

To verify the technical requirements, please seek support from a technically qualified person within your company (e.g., a system administrator).

1. **Internet connection**

   Test your internet connection, for example via:

   https://www.wieistmeineip.de/speedtest/

   Minimum download speed: **3 Mbit/s**
   Minimum upload speed: **1 Mbit/s**

Please also perform a **ping test**. This tests the network connections and routing within the network. The lower the ping value, the better.

Please note that temporary fluctuations in your internet connection may occur despite the bandwidth guaranteed by your internet provider.

Therefore, the **actual bandwidth and quality of your internet connection at the time of your online event** are decisive.

For **Wi-Fi connections**, please ensure the stability and quality of the connection.

2. **Use current browser versions**
    - Google Chrome oder Mozilla Firefox (Mac)
    - Google Chrome, Mozilla Firefox oder Microsoft Edge ab Version 83.0.478.37 (auf Windows)
    - Safari auf iOS (iPad und iPhone)

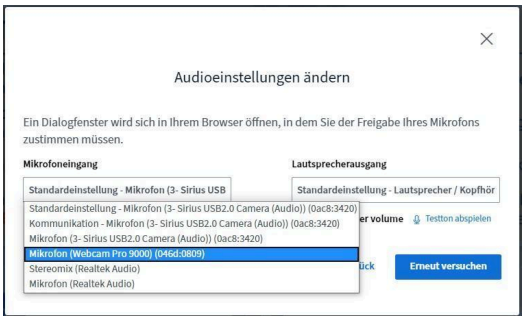
3. **Use high quality devices**

For good audio and video quality, use high-quality devices such as:

- microphone
- webcam
- headset

When entering the virtual room, ensure that the **correct devices are selected in the browser**, especially if multiple devices (e.g., several webcams) are connected.

Ensuring the correct device is used:



Poor audio quality can also be caused by participants.
By muting the microphones of affected participants, possible sources of interference can be identified.

4. **Use Powerful Devices (Computer / Tablet / Smartphone)**

Especially when several participants join with webcams, **sufficient CPU performance** is required.

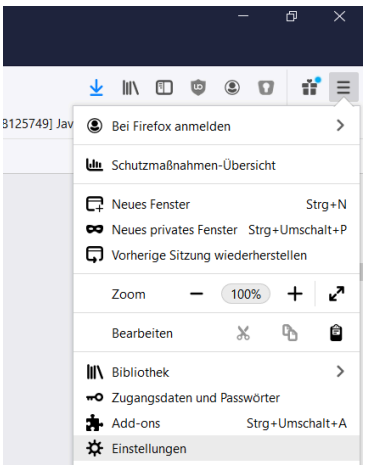
Close all unnecessary programs and check the **CPU load**, for example via the Task Manager. The CPU should not be running at full capacity.

Also make sure that the **drivers for your devices are up to date**.

5. **Check Browser Permissions**

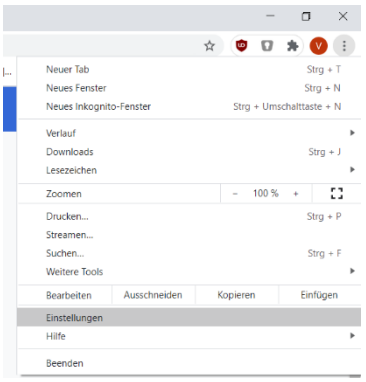
This is only necessary if the popup requesting access to the webcam or microphone does not appear and a message indicates that access is blocked.

Firefox:



- Settings ⟶ Privacy & Security ⟶ Permissions (Camera, Microphone) ⟶ Settings
- Check whether the website address of the virtual room (the address shown in your browser's address bar, e.g. https://virtualroom8.de or https://bilduin-virtualroom18.de) is listed and whether access to the devices is allowed.
- Ensure that **"Block new requests asking to access your camera"** is **not checked**.

Chrome:



- Settings ⟶ Privacy and Security ⟶ Site Settings
- For each device (camera, microphone), the setting **"Ask before accessing"** must be enabled.

Safari:

- Settings → Websites
- Check permissions for each device.

macOS (General):

- Device access is also strictly controlled by the operating system.
- If a device does not work:
  - System Settings → Security → Privacy
  - Check whether the browser is generally allowed to access the device.

iOS

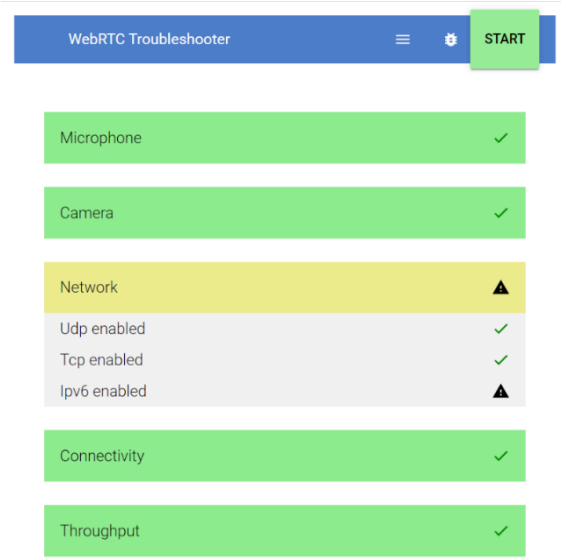
- Settings → Safari → Settings for Websites → Camera / Microphone
- Set at least to **"Ask"**.

6. **Ensure WebRTC Is Not Blocked in the Browser** (By default, WebRTC is not blocked)

   However, local firewalls, Wi-Fi router settings, or browser blockers may prevent WebRTC communication.

   You can test WebRTC compatibility here:

   https://test-webrtc.bilduin.de



If necessary, run the test multiple times with different browsers until at least one checkmark appears in each section.

Checking WebRTC Settings in Your Browser:

Firefox:

1. Enter `about:config` in the address bar
2. Click **"Accept the Risk and Continue."**
3. Search for: **media.peerconnection.enabled**
4. If the value is **false**, double-click it to change it to **true.**

Chrome:

Several Chrome extensions are known to block WebRTC, such as z. B. uBlock Origin or WebRTC Network Limiter:

1. uBlock Origin:
   chrome-extension://cjpalhdlnbpafiamejdnhcphjbkeiagm/dashboard.html#settings.html

   Hier bitte die WebRTC ggf. freigeben - defaultmäßig ist dies der Fall.

2. WebRTC Network Limiter

   If this extension is installed, select the option: **„Give me the best media experience“**

7. Firewall configuration

If firewalls are used, the following ports must be open (which is usually the case).

Ports	Protokoll	Beschreibung
80	TCP	HTTP
7443	TCP	HTTPS
443	TCP/UDP	TLS listening port (TURN over TLS)
3478	TCP/UDP	Coturn listening port (STUN)
16384 - 32768	UDP	WebRTC, FreeSWITCH, Kurento, HTML5 RTP streams

- **Allow Access to the Virtual Room Servers:**
  - virtualroom2.de (146.0.35.121), virtualroom7.de (217.79.181.5), virtualroom8.de (217.79.189.165), virtualroom9.de (93.186.201.193)
  - bilduin-virtualroom18.de (85.114.128.23), bilduin-virtualroom19.de (89.163.135.62)
  - meet.virtualroom1.de (93.186.201.65), meet.virtualroom2.de (146.0.35.121)

- **Allow Access to TURN Servers:**
  - turn-1.de (89.163.231.211), turn-2.de (5.199.138.48), turn-3.de (62.141.44.220)

8. Ensure VPN Clients or Proxies Do Not Block WebRTC

Please verify that WebRTC is not blocked by your VPN client or proxy configuration.

9. Proxy Server Must Not Block HTML5 WebSocket Communication

HTML5 WebSocket communication significantly reduces unnecessary network traffic and latency compared to traditional polling or long-polling solutions.

Proxy servers usually work without issues with WebSockets.
In some cases, additional proxy configuration or updates may be required for smooth communication.

Test Your Browser Compatibility:

https://websocketstest.com/

https://www.webrtc-experiment.com/DetectRTC/

https://html5test.co/

10. **Disable SSL Scanning if necessary**
11. **If all requirements are met, please test your setup using our test server as described above:**

    https://test-vr.ecosero.de