

Xenium Analyzer: Network Connectivity Guidelines

Introduction

Xenium In Situ is the next-level in situ solution for subcellular profiling of hundreds of RNA targets. Xenium Analyzer combined with customizable panels, visualization software, and easy-to-follow workflow is a powerful in situ profiling platform. This Technical Note provides network connectivity guidelines for the Xenium Analyzer and describes:

- remote performance monitoring
- data collected by 10x Genomics
- live remote support
- security considerations
- additional connectivity details

The Xenium Analyzer instrument has a highly interactive user interface paired with network connectivity, intended to provide a seamless user experience along with efficient remote performance monitoring to minimize instrument downtime. If any unexpected instrument errors occur, the user-controlled remote support access to the instrument allows 10x Genomics Support team to quickly troubleshoot the errors. See the following sections for detailed information.

Refer to the *Xenium Analyzer instrument user guide* (CG000584) for details regarding various instrument components, user interface navigation, and all additional features.

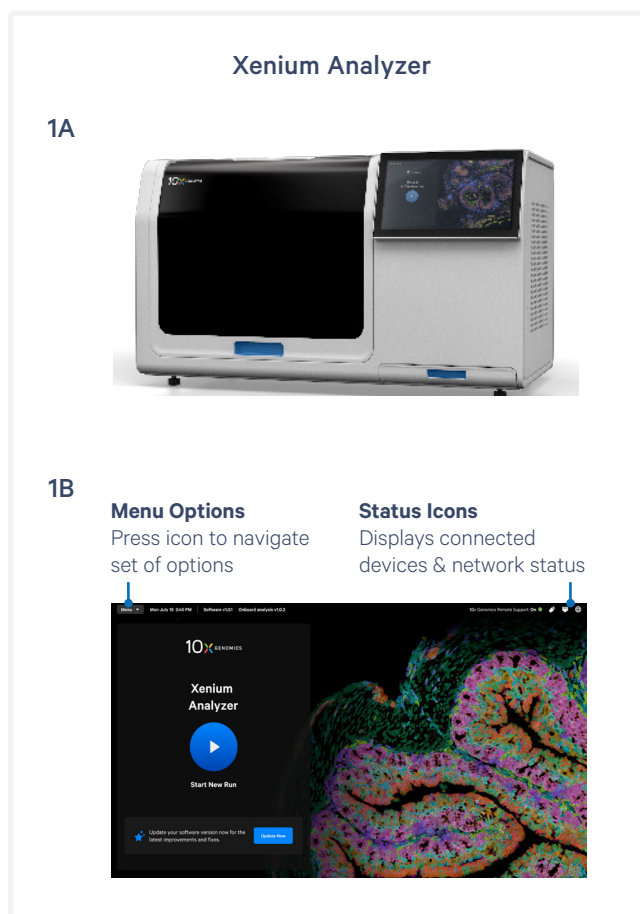


Figure 1. Xenium Analyzer (1A) has a user-friendly interface (1B) that displays the network connectivity status.

Remote Performance Monitoring

Monitoring the performance of the Xenium Analyzer helps ensure that the instrument is performing optimally and maximizes instrument uptime. This also gives 10x Genomics the ability to respond quickly and troubleshoot any issues that may occur. While you focus on processing samples and data collection, the instrument will proactively collect performance data to allow the 10x Support Team to address any potential instrument downtime.

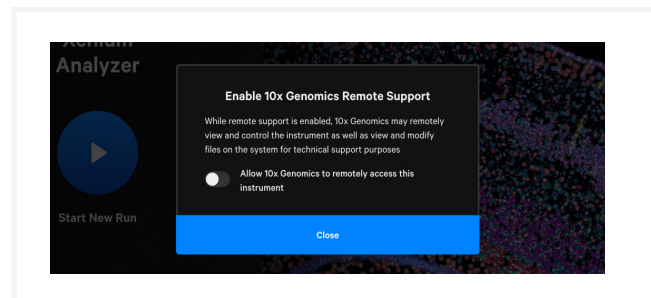
Data Collected by 10x Genomics

No biological sample data is collected by 10x Genomics. Remote data collection is limited to the following items:

- Calibration data
- Instrument operation logs
- Optical, mechanical and fluidic system logs
- Computer system logs

Customer-controlled Live Remote Support

Should an unexpected error occur with the Xenium Analyzer, 10x Genomics is committed to troubleshooting the problem as soon as possible. An optional, customer-controlled live support feature allows you to invite a 10x Genomics representative to remotely access the instrument and observe the problem in real-time to find and implement an appropriate solution. The live support option is completely customer controlled and can be locally enabled or disabled by the customer at any time by using the instrument settings menu.



Security Considerations & Features

Topic	Xenium Feature
Data NOT collected	Biological sample data, personal health information All analysis and sample data processing is done locally on instrument
Required inbound ports	No open inbound ports required
Data center encryption at rest	Encrypted at rest with AES-256
Data encryption in transit	Encrypted with TLS
Access Limitations	Live support can be disabled on instrument at any time
Instrument firewall	Blocks all inbound connections
On instrument restrictions	No installed browser, account runs with restricted permissions
Operating System	Linux-based OS
Updates & Patches	Provided by 10x through the Xenium application on instrument

Table 1. Security considerations.

Detailed Allowlist of Hosts & Ports

Table 2 below lists the complete set of hosts, ports, and protocols in use by the Xenium Analyzer. It is highly recommended to use the DNS entries in your firewall rules instead of the IP addresses as the IP addresses may be updated from time to time.

Local Connectivity

The Xenium Analyzer is designed to integrate into the customer's local network without the need for joining a specific local domain. It is also shipped as a complete software system without the option to install additional software or security solutions.

Storage Requirements

For estimates on how much storage to prepare for a Xenium installation, consult [this page on the 10x Genomics Support website](#). Network storage is recommended for Xenium. Users can mount shares directly on the instrument.

Application	Protocol	Source IP:Port	Destination IP:Port
10x Telemetry	TCP	<Xenium IP>:*	envoy.10xgenomics.com:443
Tailscale Login, Log and Control	TCP	<Xenium IP>:*	login.tailscale.com:443 controlplane.tailscale.com :443 log.tailscale.com:443 log.tailscale.io:443
Tailscale DERP	TCP	<Xenium IP>:*	derp1f.tailscale.com:443 derp1g.tailscale.com:443 derp1h.tailscale.com:443
NTP	UDP	<Xenium IP>:123	pool.ntp.org:123

Table 2. Complete set of hosts, ports and protocols in use by the Xenium Analyzer.

Additional Technical Details

Outbound Connectivity

To provide remote monitoring and remote support, Xenium solely requires outbound connectivity to 10x Genomics systems. No inbound ports need to be opened on your institution's firewall.

For remote support, 10x Genomics uses Tailscale, a modern, secure end-to-end encrypted tunnel built on Wireguard. For more information about Tailscale's security and compatibility with your network, refer to <https://tailscale.com/security/> and <https://tailscale.com/kb/1230/tailnet-lock-whitepaper/>.

Given the outbound-only requirements, it is possible that Tailscale is already supported on your network. To confirm correct Tailscale operation, run the following command on your network on a computer separate from the Xenium instrument:

```
$ tailscale netcheck
```

A successful Tailscale connection should produce a result similar to the one shown below:

```
$ tailscale netcheck
```

Report:

- * UDP: true
- * IPv4: yes, 64.125.32.42:61871

- * IPv6: no, but OS has support
- * MappingVariesByDestIP: true
- * HairPinning: false
- * PortMapping:
- * Nearest DERP: San Francisco
- * DERP latency:
 - nyc: 68.3ms (New York City)

An unsuccessful Tailscale connection should produce a result similar to the one shown below:

```
$ tailscale netcheck
```

Report:

- * UDP: false
- * IPv4: (no addr found)
- * IPv6: no, unavailable in OS
- * MappingVariesByDestIP:
- * HairPinning:
- * PortMapping:
- * Nearest DERP: unknown (no response to latency)

Tailscale provides additional guidance on how the service operates at:

<https://tailscale.com/kb/1082/firewall-ports/>

Document Revision Summary

Document Number	CG000645
Title	Xenium Analyzer: Network Connectivity Guidelines
Revision	Rev B to Rev C
Revision Date	October 2023

Specific Changes:

Updated to include additional details regarding security features. Updated other sections, including allowlist of hosts and port, for clarity and accuracy.

General Changes:

The wording and order of instructions were changed for additional clarity.

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