

# Choosing between REST and SOAP: A guide for engineers

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When designing a web service, you must carefully evaluate the choice between SOAP and REST. This guide explains their strengths, limitations, and use cases to help you make an informed decision.

## SOAP overview

SOAP (Simple Object Access Protocol) is a protocol for exchanging XML-based messages over a network. It uses Web Services Description Language (WSDL) to define:

- Resources, operations, and procedure calls
- Message structure, encoding, and encapsulation
- Bindings with network transport protocols

SOAP APIs are often auto-generated using tools that create server-side and client-side code templates, but the resulting implementations can be challenging to develop and maintain.

## When to choose SOAP

SOAP is suitable for:

- **Enterprise-level security:** Supports WS-Security for encryption, authentication, and message integrity.
- **Complex transactions:** Ensures reliability in distributed environments through features like ACID-compliant transactions.

- **Strict contracts:** Enforces formal service definitions using WSDL, ensuring consistency and reliability.
- **Stateful interactions:** Useful for cases requiring session management or multi-step workflows.
- **Legacy systems:** Facilitates integration with older enterprise systems.

## SOAP limitations

- **Tight coupling:** Changes to the server often require updates to the client, reducing flexibility.
- **XML-only payloads:** Mandatory use of XML increases message size and complexity.
- **High overhead:** SOAP messages are verbose, requiring more bandwidth and processing power.
- **Slower development:** Complex implementation results in longer development cycles.

## REST overview

REST (Representational State Transfer) is an architectural style that leverages standard HTTP methods for stateless web service interactions. REST APIs:

- Use URLs to represent resources.
- Support multiple data formats, including JSON, XML, and HTML.
- Implement HTTP methods such as **GET**, **POST**, **PUT**, **DELETE**, **PATCH**, and more.
- Can mark responses as cacheable, reducing client-server interactions.

Tools and frameworks can generate REST APIs and documentation from application code, enabling rapid development.

## When to choose REST

REST is ideal for:

- **Public APIs:** Designed for widespread adoption and third-party integrations.
- **Rapid development:** Simple and flexible, with fewer constraints than SOAP.
- **Data format flexibility:** Supports lightweight formats like JSON, ideal for modern web and mobile applications.
- **Scalability and caching:** Statelessness and response caching improve performance and scalability.
- **Broad adoption:** REST is widely supported by tools, frameworks, and a large developer community.

# REST limitations

- **Security challenges:** Requires additional measures (e.g., HTTPS, token-based authentication) to ensure security.
- **Limited operations:** Restricts interactions to standard HTTP methods, which may not cover all use cases.
- **Scalability complexities:** Point-to-point communication can complicate scaling with multiple clients.
- **Versioning difficulties:** Major schema changes can break clients if not managed properly.

# Decision guide

- Use **SOAP** for secure, reliable, and stateful operations, especially in enterprise environments or when working with legacy systems.
- Use **REST** for simple, scalable, and fast APIs that support modern web or mobile applications and prioritize flexibility.

## TIP

Choose REST for most modern web services unless your requirements specifically align with SOAP's strengths, such as strict contracts or enterprise-grade security.

# Key considerations

- Assess your team's expertise with SOAP or REST.
- Plan for future maintenance, including versioning strategies for REST APIs.
- Use tools for API generation and documentation to speed up development and ensure consistency.