



Environmental Monitoring

Connectivity Playbook



Building the Internet of Environmental Sensors

This educational guide introduces the benefits of enabling connectivity as a feature to your tank monitoring products and solutions. It recommends the special considerations to consider when choosing a connectivity type.

IoT provides policy levers for sustainability and accurate road usage pricing

Environmental monitoring covers a wide range of applications for the IoT. It involves everything from air quality (levels of Carbon Dioxide, Nitrogen Oxides and particles in urban environment) to water quality and smoke detection when forest fires start. Using IoT environmental sensors for these various applications can take an otherwise labor-intensive process and make it simple and efficient.

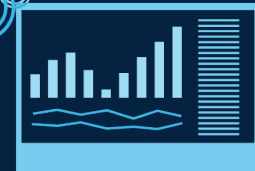


After the IoT Connectivity

- Supports government policies and incentives for responsible behavior.
- Adds to richness of data available for insights in adjacent industries such as smart grid and smart cities applications.
- Enables responsible audits and compliance of environmental commitments.
- Opens public data for societal benefit.
- Fine-tunes road usage pricing based on granular emissions data.

Before the IoT Connectivity

- Static collection of environmental metrics data; no iterative use of available data.
- Manual compliance activities for meeting environmental commitments.
- Lack of granular data on environment metrics for policy development.
- Absence of a road usage pricing that captures each type of on-road vehicles.

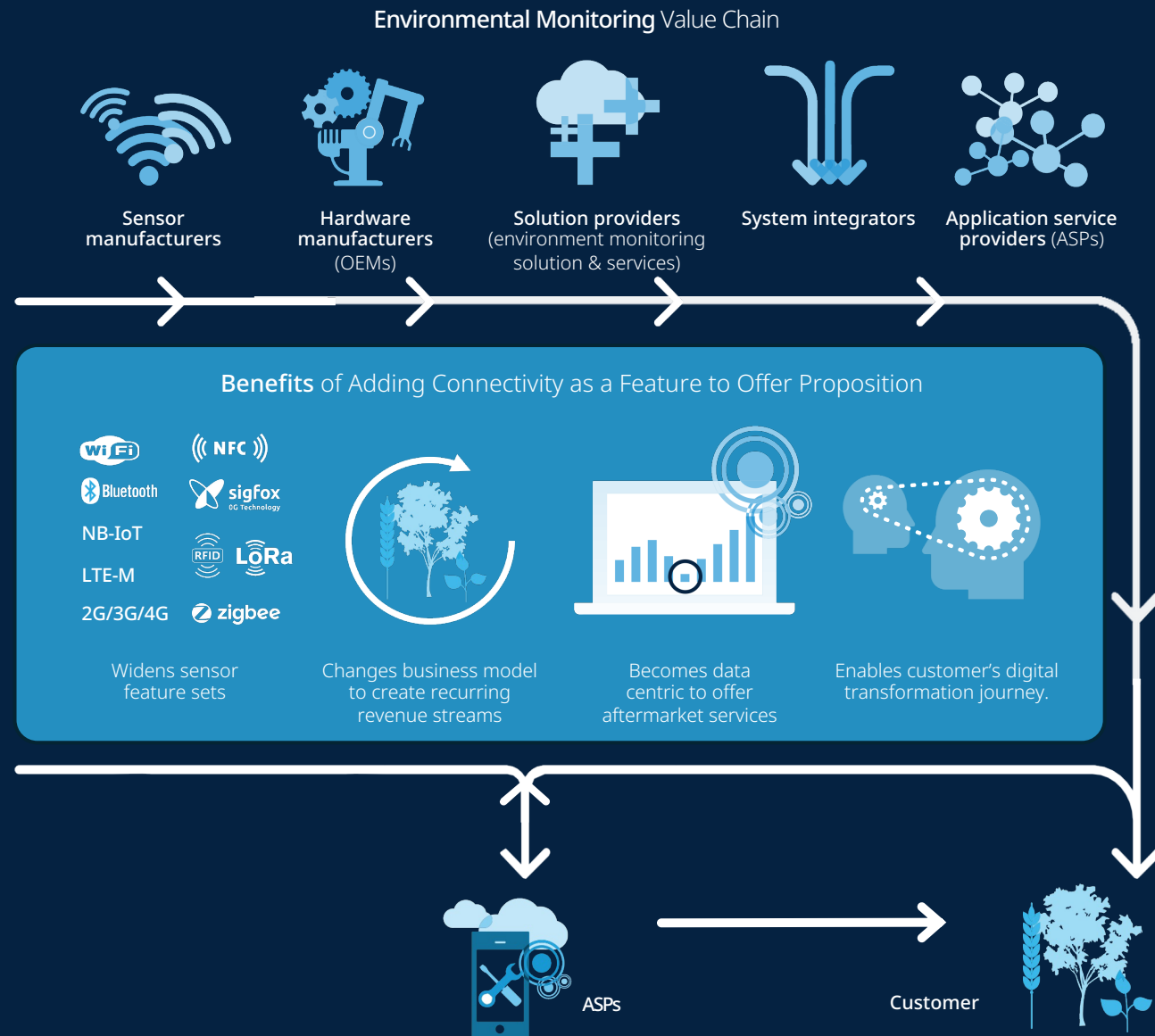


Adding Connectivity as a Feature

The environment monitoring value chain, from sensor manufacturers to solutions providers to applications service providers, can facilitate end-user benefits by making connectivity a default feature in their products and solutions. As illustrated in the figure, once connectivity is enabled, everyone on the value chain can move closer to the end customer. Through resulting data about measurements of environmental metrics, each value chain participant including application service providers can offer aftermarket services such as maintenance, upgrades, support, and consultancy bundles.

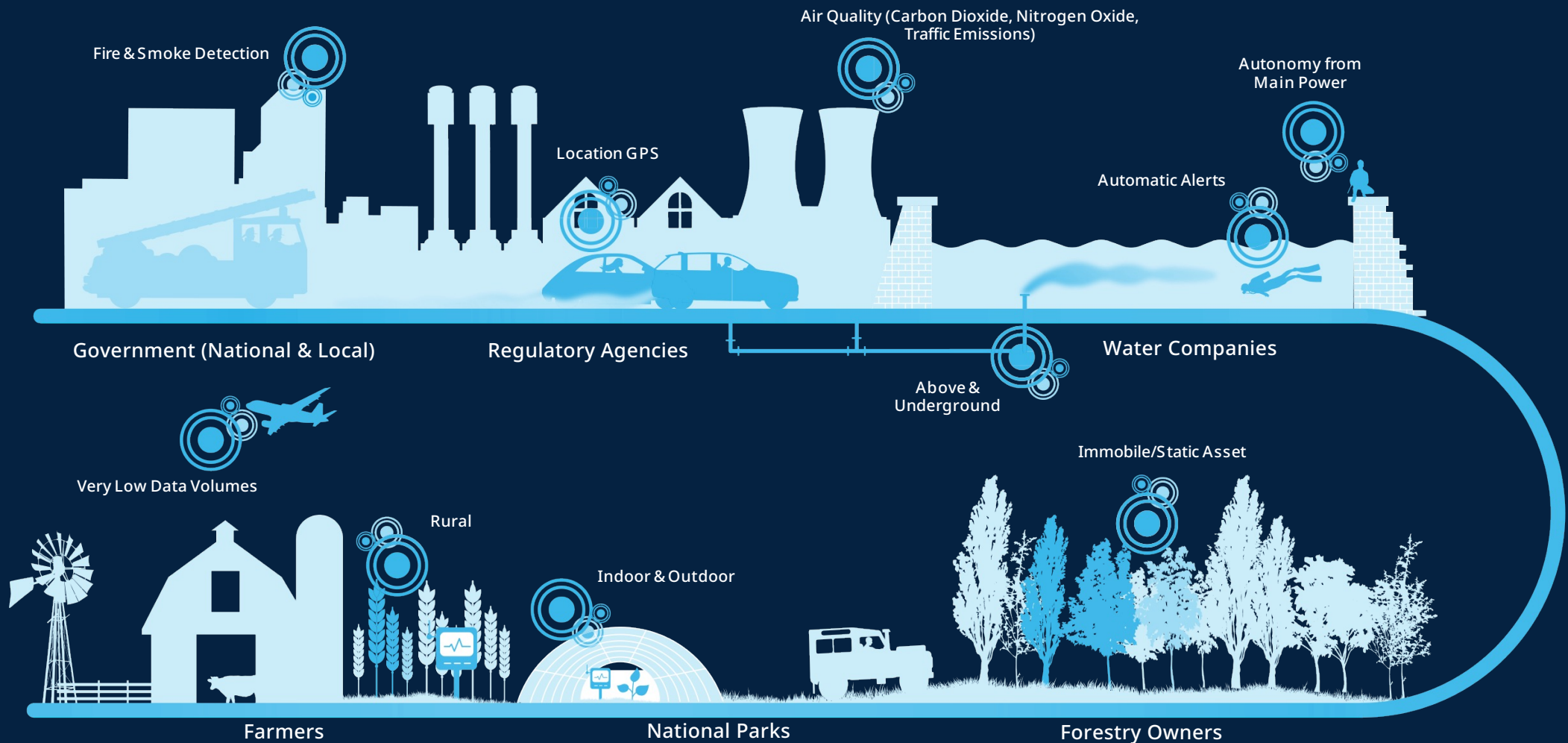
Enabling IoT connectivity benefits everyone on the value chain

- **Sensor manufacturers** differentiate from their peers by simplifying the connectivity decision making for the rest of the value chain.
- **Hardware Manufacturers (OEMs)** can stand out by offering a connected environment monitoring product from the beginning, simplifying their customers' connectivity decision.
- **Solution providers (environment monitoring solutions and services)** expand their service portfolio by taking on their customers' non-core data centric functions. Once connectivity is enabled, solution providers can help their customers turn environmental data into insights.
- **System Integrators** in their capacity of running digital transformation projects they have the potential to expand their consultancies to drive new applications derived from having environmental insights.
- **Application service providers (ASPs)** develop new applications for end customers in the industrial vertical through access to aggregated environmental data.



Understanding the Connectivity Needs of Environmental Monitoring

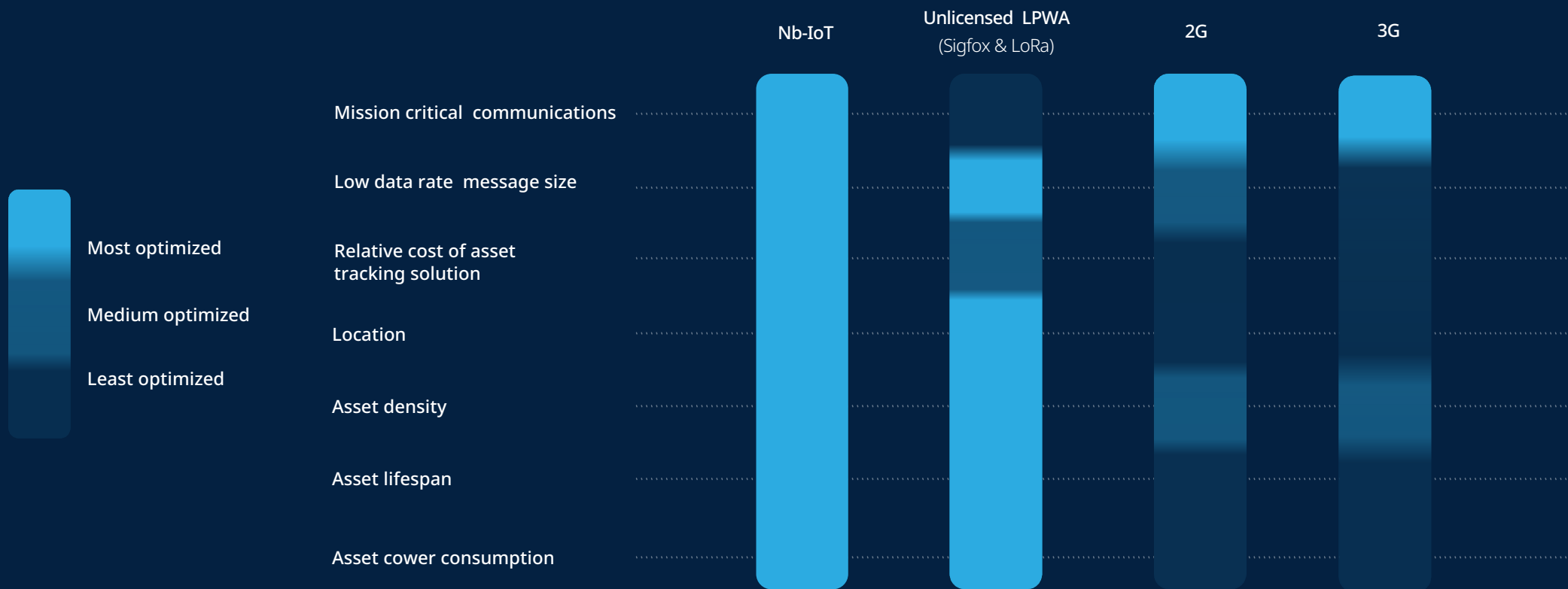
Environmental monitoring is a relatively under-developed IoT application, limited by the costs and power constraints of the connectivity technology. Low power, wide-area (LPWA) technology is perfectly suited for environmental monitoring, as it can connect devices that need to stay in the field for many years and send small amounts of data over a long range. Some IoT applications need to transmit only tiny amounts of information, an example being a sensor that sends data only if it senses smoke in a forest. The figure below illustrates the diversity of connectivity requirements across different types of field for monitoring deployment in different environments.



Low-Data Rate Connectivity Technology

Transformation opportunities for both end customers in the industry vertical and environment monitoring applications stem from building an internet of environmental sensors. The choice of which connectivity must therefore be made with a view on cost, performance, and benefits. There are a variety of connectivity options, from traditional cellular technologies such as 2G/3G and recent ones such as LPWA. There are two groups of LPWA technologies. Those that use unlicensed spectrum such as Sigfox and LoRa and those that use licensed spectrum that is cellular-based such as NB-IoT and LTE-M. The latter are part of the 5G roadmap according to the GSM Association, which as a licensed and standardized technology, offer carrier grade connectivity reassurances. The figure below applies the 7 characteristics of environment monitoring to 4 types of common connectivity options and illustrates that environment monitoring is best served by NB-IoT in terms of cost, performance, and expected benefits.

Reading the heatmap vertically, NB-IoT fulfils environment monitoring requirements, that the connectivity is suited to handle mission critical communications, the actual data transmitted, in relative cost of environment monitoring solution, be used both indoors vs. outdoors and over and underground, communicate over long distances, to last more than 10 years, and to low power consumption. The heatmap can also be read horizontally. For example, environment monitoring, despite not being a core operational process, has mission critical requirements in certain industry vertical. As such, Nb-IoT, 2G, and 3G fulfil this requirement by virtue of being offered on a licensed spectrum.



1NCE Offering

1NCE is a perfect match with the Environmental Monitoring solutions, meeting all basic requirements while addressing key challenges:

Requirements	Typical customer challenge	Why 1NCE is the best match?	Standard solutions
Data & Pricing	<ul style="list-style-type: none">• All-in-1 solution• Cost transparency• Low & high data project support	<ul style="list-style-type: none">• All-in-1: 10 EUR/10 years for connectivity & software• One-time cost: no monthly or hidden fees• Lifetime Flat: 500 MB, 250 SMS + extra High Data IoT: 5 EUR/GB, speed 25 Mb/s	<ul style="list-style-type: none">• Complex & fragmented pricing, costly integrations• Monthly, fixed & hidden fees• No high-data requirements met
Coverage	<ul style="list-style-type: none">• Global coverage• Cellular and LPWA radio technology• Multiple network and operator switch	<ul style="list-style-type: none">• 173 countries coverage; no zoning or local pricing discrepancies.• Integration with LPWA networks.• Freedom-to-Switch to change providers without replacing a SIM.	<ul style="list-style-type: none">• Region or zone-restricted coverage• NB-IoT and LTE-M limitations (10-20 networks globally)• Complex contracts and vendor lock-in
Services	<ul style="list-style-type: none">• Device control through one interface• Interoperability with 3rd party services	<ul style="list-style-type: none">• Device monitoring and management included• 3rd party software, like Datacake, Mender, Microsoft Azure, natively integrated with 1NCE OS and CMP	<ul style="list-style-type: none">• Extra costs for monitoring & data management• Limited compatibility with third-party IoT software
Longevity	<ul style="list-style-type: none">• Supports emerging technologies• Ability to switch operators• Services that are liable for the device lifecycle	<ul style="list-style-type: none">• NB-IoT or LTE-M for devices with lifecycle of 10+ years• eSIM (eUICC) for flexible, multi-operator functionality• Reliable cellular-based networks & Tier 1 operators	<ul style="list-style-type: none">• Limited LPWA, especially in challenging environments• Extra costs due to network or service changes• Short-term contracts and pricing models

The 1NCE Promise

Simplify your value chain with an **all-inclusive model** and additional features & services.

1NCE All-in-One Solution

1NCE IoT Lifetime Flat

10 EUR for 10 years lifetime subscription

1NCE Connect

- ✓ 500 MB, 250 SMS
- ✓ 173 countries coverage
- ✓ NB-IoT, LTE-M, 2G, 3G, 4G
- ✓ Connectivity management platform
- ✓ Unlimited API usage
- ✓ VPN, APN included

1NCE OS

- ✓ Device Authentication
- ✓ Energy Saver
- ✓ Device Inspector
- ✓ Device Locator
- ✓ Device Integrator
- ✓ Freedom-to-Switch

1NCE SIM Card
depending on the application

- + IoT SIM Card Business 1 EUR
- + IoT SIM Card Industrial 2 EUR
- + IoT SIM Chip Industrial 2.50 EUR



Extra Services

Top-up Option

when a device reaches data limits in 10+ years

- + Extra 500 MB & 250 SMS for 10 EUR

Lifetime Extension

for those who want to exceed 10 years

- + Extra 10 years for 10 EUR

1NCE Plugins

available to trial for free

- + FOTA by Mender
- + Data Visualization by Datacake
- + Azure IoT Integration by Tartabit
- + Device Debugging by Memfault

Alternative Products

1NCE High Data IoT

for projects with high data requests

- + 5 EUR/GB, speed 25 MB/s

About 1NCE

Delivering **IoT software and connectivity** for life.

1NCE is a company offering a software platform for connected products that delivers future-proof, hassle-free IoT in 173 countries and regions. The software platform enables customers to easily, securely and reliably collect device data and turn it into actionable intelligence. This accelerates time-to-market for data collection projects by months, increases device lifetime by years, and allows efficient management of sensors from initial deployment to the end of the product lifecycle. More than 23,000 users and 60 Fortune 500 companies trust 1NCE with 30 million connected products worldwide.



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