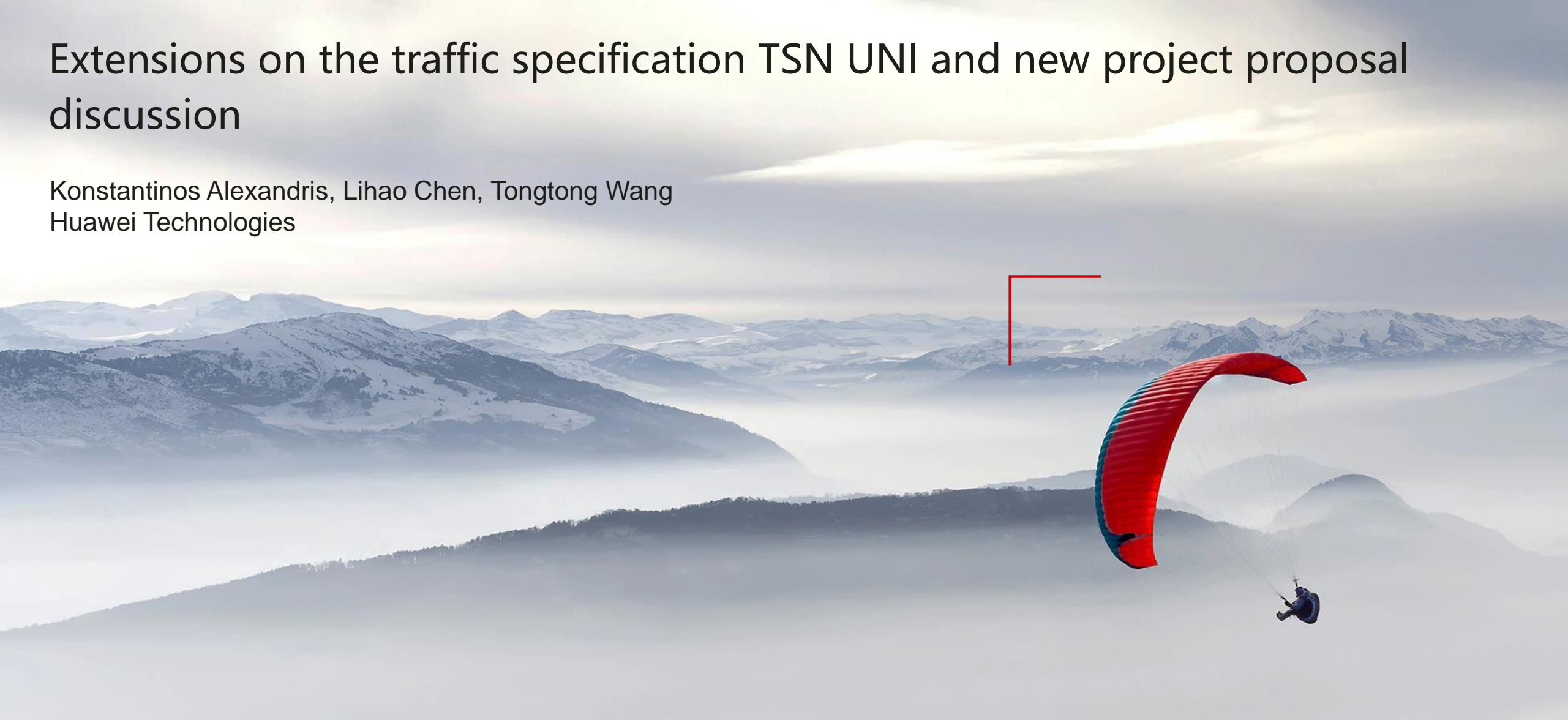# Extensions on the traffic specification TSN UNI and new project proposal discussion

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Introduction

- **Flunctuation** in traffic characteristics has not been thoroughly investigated in existing traffic specification (**TSpec**) TLVs.

- Common **resource allocation** schemes need to be revised to **ensure deterministic QoS** based on diverse traffic models.

- **Shapers** parameterization is not **fully in coherence** with **TSpec TLVs,** i.e., user-to-network requirements.

- Reservation of resources relies only on **basic user traffic profiling** and does not cover advanced network provisioning **QoS control** methods.

- **Trials** [1-3] to extend Tspec of **P802.1Qdj/Qdd** in former meetings. **Disposition:** More discussion is needed on the use-cases.

[1] https://www.ieee802.org/1/files/public/docs2022/dj-alexandris-extension-TSN-UNI-traffic-specification-0522-v01.pdf
[2] https://www.ieee802.org/1/files/public/docs2022/new-alexandris-extension-traffic-specification-TSN-UNI-0722-v01.pdf
[3] https://www.ieee802.org/1/files/public/docs2022/dd-alexandris-reworking-extensions-TSN-UNI-RAP-1122.pdf

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Background in IEEE 802.1 TSN

- MSRP is limited to basic traffic parameterization in Talkers **REGISTER_STREAM.request** Tspec [4]:

  - **MaxFramesPerInterval**
  - **MaxFrameSize**

- **Optional Tspec:** Time-aware TLV covers the case of Scheduling traffic (ST) in Qcc [4]:

  - **EarliestTransmitOffset**
  - **LatestTransmitOffset**

- **What about burst traffic?** The above parameters do not suffice in configuring relevant TSN shaping features:

  - **IEEE 802.1Qcr:** ATS [5] concerns the Committed Information Rate (CIR), Committed Burst Size (CBS) and Minimum Frame Size [6].
  - **IEEE P802.1Qdd:** Token Bucket Tspec sub-TLV supports CIR/CBS parameterization.

Table 46-8—TrafficSpecification elements

Name	Data type	Reference
Interval	rational	46.2.3.5.1
MaxFramesPerInterval	uint16	46.2.3.5.2
MaxFrameSize	uint16	46.2.3.5.3
TransmissionSelection	uint8	46.2.3.5.4

Table 46-9—TSpecTimeAware elements

Name	Data type	Reference
EarliestTransmitOffset	uint32	46.2.3.5.5
LatestTransmitOffset	uint32	46.2.3.5.6
Jitter	uint32	46.2.3.5.7

IEEE Std 802.1Qcc-2018

	Octet	Length
MaxTransmittedFrameLength	1	2
MinTransmittedFrameLength	3	2
CommittedInformationRate	5	8
CommittedBurstSize	13	4

Figure 99-14—Value of Token Bucket TSpec sub-TLV

IEEE Std P802.1Qdd

[4] Section **46.2.3.5**: IEEE Std 802.1Qcc.
[5] Johannes Specht. On ATS. https://www.ieee802.org/1/files/public/docs2021/new-specht-onats-0921-v01.pdf
[6] https://www.ieee802.org/1/files/private/dd-drafts/d0/802-1Qdd-d0-6.pdf

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Burst traffic – Use-case example
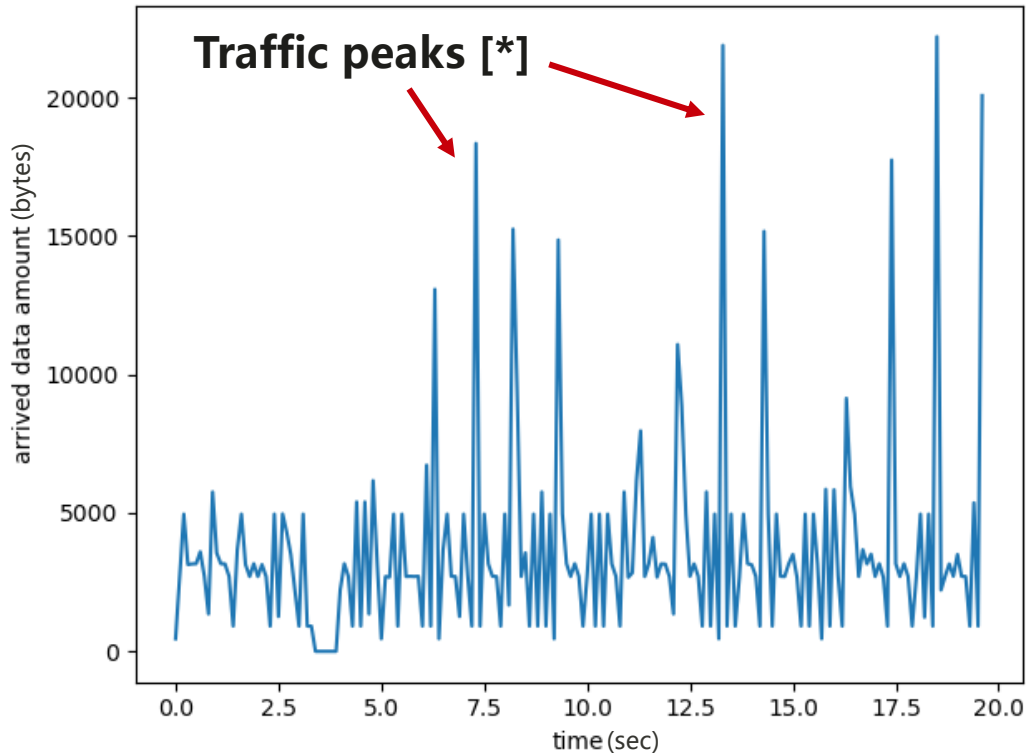
IP Camera/CCTV/Video conference

**SCADA/
Streaming Service**

Traffic peaks [*]

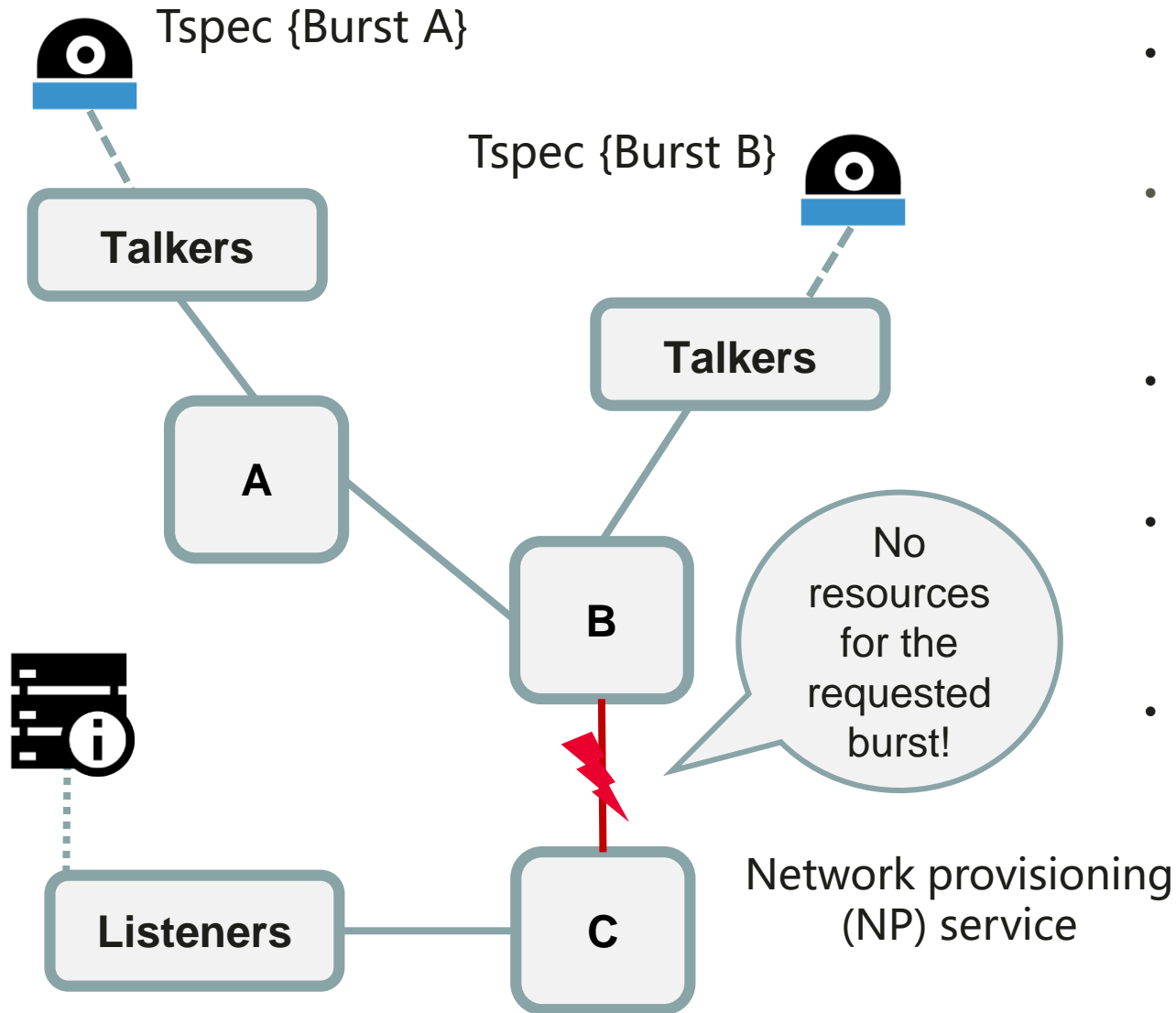| Talkers | ⟷ | Network | ⟷ | Listeners |

- Traffic could be **not periodic, time-triggered.**

- **Burst arrivals** are frequently met. Upper bounds on stream characteristics (i.e., arrival curves) usually described in terms of burst and rate.

- TSN can guarantee **deterministic QoS** for those types of traffic (e.g., with ATS), on the condition that the arrival stream patterns are described properly.

- Ensure **co-existence** with various types of traffic.

- [*] Packet capture example from a video conference in a campus network or video surveillance [7] in a smart factory.

[7] https://www.securityworldmarket.com/me/Newsarchive/tdvs-ivs-solution-for-building-and-factory-automation

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Burst traffic – Resource allocation

Tspec {Burst A}

Tspec {Burst B}

Talkers

Talkers

A

B

No resources for the requested burst!

Listeners

C

Network provisioning (NP) service

- **Typical use-cases:** Industrial automation, automotive networks, campus LAN, private wireless etc.

- **Gap:** No matter the **use case** and no matter the **configuration** model; the **burst traffic** model is not part of the current UNI Tspec (**802.1Qcc**).

- The **user** shall inform the **network** with the respective **Tspec** projected to the burst traffic requirements.

- A **status** information carrying configuration shall be received from the **network** to the **user** in case the stream establishment is successful.

- Otherwise, a **failure** information is received by the user.

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Summary – Next steps

- **Main ingredients:** Committed Information Rate, Committed Burst Size (and also Min. frame size).

- Used to compute the **E2E delay** upper bound of a stream, i.e., applies to ATS (**802.1Qcr-Annex V.2**).

- **P802.1Qdd** specifies the aforementioned parameters in **Token bucket TSpec sub-TLV**.

- Nevertheless, those mechanisms are also needed in the general UNI specification (**802.1Qcc-46.2.3.5**).

- **Proposal:** Specify a **new Tspec** based on the extensions on top of the **existing UNI TSpec**.

- **Open discussion** with **TSN TG:** Would that lead to a **new project** to further cover such requirements?

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Thank you.