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| logogreen | ASIA-PACIFIC TELECOMMUNITY | **Document:**  **ASTAP-28/OUT-20** |
| **The 28th APT Standardization Program Forum (ASTAP-28)** |
| 6-10 March 2017, Bangkok, Thailand | 10 March 2017 |

Working Group on Network and System (WG NS)

**QUESTIONNAIRES ON REQUIREMENT**

**OF FUTURE TRANSPORT NETWORK TECHNOLOGIES**

This document contains two questionnaires to compile situations and requirements of APT members for future transport network technologies and originally made at ASATAP-27. This revised document includes changes in the Rapporteur of the Questionnaire and some contents. The result will be used to create an APT report that will be beneficial for APT members.

The due date for your response is on **August 1, 2017**.

**Questionnaire on Requirement of Future Transport Technologies for SDN&NFV**

**Section 1: Elementary Part**

1. **Introduction:**

Transport networks are expected to have more capacity, flexibility, reliability and functionality as well as further cost reduction to accommodate rapidly growing network services including IoT and 5G mobile. Software Defined Networking (SDN) and Network Function Virtualization (NFV) are promising technologies which have possibility to add flexibility, reliability and functionality through their programmability of transport networks. SDN can also be applied to wide area optical transport network as “Transport SDN” to add flexibility and programmability by cooperating with controls of other layer networks (e.g., data center networks, IP networks). Transport SDN is promising technologies for network operators to reduce CAPEX/OPEX and time-to-market by combining other layer SDN and NFV.

Therefore, architecture and interface of Transport SDN to achieve cooperation among various systems are actively discussed in many standards development organizations (SDOs) (e.g., ITU-T SG15, Open Networking Foundation, IETF). However, currently the discussions of the SDOs are based on only their use cases and requirements and does not seem to reflect those of APT operators, and it is not sure the output specifications of the SDOs can fit to APT operators.

Additional information and a structure of the APT report are also attached in Annex of this document.

1. **Objective of the Questionnaire:**

In order to input and match the requirements of APT operators to the SDOs, APT operators should make common requirements as an APT report. At least, the requirements of Transport SDN should solve current issues of APT operators mainly related to operation and control.

It is essential in developing APT report to collect information about transport networks from as many APT member countries as possible and it is requested that the governments could encourage the telecom carries to reply to the questionnaire.

This questionnaire is to collect information for making the common requirements and the APT report according to current operator issues.

1. **Responsible Group:**

FN/NGN EG

1. **Rapporteur of the Questionnaire:**

Name: Makoto Murakami

Email: murakami.makoto@lab.ntt.co.jp

Name: Kaoru Arai

Email: arai.kaoru@lab.ntt.co.jp

Organization and country: NTT, JAPAN

1. **Meeting at which the Questionnaire was approved:**

ASTAP-28

1. **Target Responder:**

All the telecom carriers in APT member countries are the target responders. To ensure the collection of responses to this questionnaire, it is appreciated if the questionnaire is formally addressed to the government of each APT member country, and the government ask for replies from the telecom carriers and then compile and send a reply to the APT secretariat. This is because most attendees in ASTAP are normally from the government or the regulatory and most telecom carriers are possibly not well aware of ASTAP activities.

1. **Deadline for Responses:**  August 1, 2017

**Section 2: Questionnaire Part**

**2-1. List of questions**

| **No** | **Question** |
| --- | --- |
|  | **1-1. Do you want to reduce time and workload of fault localization?** |
| **1-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **2-1. Do you want to reduce time and workload of fault recovery?** |
| **2-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **Is the reason why you need much time and workload to localize/recover the fault due to “Silent failure” or “Intermittent failure”?**  *(If you are interested in Q1 or Q2.)* |
|  | **4-1. Do you want to reduce human errors?** |
| **4-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **5-1. Do you want to reduce time and workload of provisioning?** |
| **5-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **6-1. Do you want to reduce recovery time and on-site maintenance time by using flexible and automatic recovery methods (e.g., restoration) which can handle even multiple failures?** |
| **6-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **7-1. Do you want to reduce backup resources (e.g., No. of transport equipment, components and fibers) by sharing backup resources among some active communications (connections/paths) using flexible and automatic recovery methods (e.g., 1:N protection, restoration)?** |
| **7-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **8-1. Do you want to reduce necessary resources (e.g., No. of transport equipment, components and fibers) by using traffic optimization which can handle traffic fluctuation?** |
| **8-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **9-1. Do you want to reduce time, cost and workload to deploy new network services?** |
| **9-2. What is the environment of this issue?**  *(If answer is "A little" and more and if possible.)* |
| *(If you have another environment, please copy the above and reply.)* |
|  | **Other issues.** *(If you have.)* |
|  | **Which are your most three important issues?** |

**2-2. Answer sheet**

| **No** | **Question** | **Answer** |
| --- | --- | --- |
|  | **1-1. Do you want to reduce time and workload of fault localization?**  \*Currently faults, which need much time and workload to localize them, occur frequently enough to impact on your operation. | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **1-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **1-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **1-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **1-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **1-2-4. Vendor** [Please choose 1]  Multi-vendor  Single-vendor |
| **1-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **2-1. Do you want to reduce time and workload of fault recovery?**  \*Currently faults, which need much time and workload of maintenance and operation to recover, occur frequently enough to impact on your operation. | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **2-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **2-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **2-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **2-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **2-2-4. Vendor** [Please choose 1]  Multi-vendor  Single-vendor |
| **2-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **Is the reason why you need much time and workload to localize/recover the fault due to “Silent failure” or “Intermittent failure”?**  *(If you are interested in Q1 or Q2.)*  \*Silent failure: Failure with no alarm.  \*Intermittent failure: Failure that cannot be consistently reproduced in the same conditions. It works sometimes, fails at other times. | [Please choose 1.]  Silent failure  Intermittent failure  Both  Not sure |
|  | **4-1. Do you want to reduce human errors?**  \*Currently faults caused by configuration miss occur frequently enough to impact on your operation. | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **4-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **4-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **4-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **4-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **4-2-4. Vendor** [Please choose 1]  Multi-vendor  Single-vendor |
| **4-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **5-1. Do you want to reduce time and workload of provisioning?**  \*Currently you need much time to set new connection for new users. | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **5-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **5-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **5-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **5-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **5-2-4. Vendor** [Please choose 1]  Multi-vendor  Single-vendor |
| **5-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **6-1. Do you want to reduce recovery time and on-site maintenance time by using flexible and automatic recovery methods** (e.g., restoration) **which can handle even multiple failures?**  \*Currently faults occur frequently and 1+1/1:1 protection cannot enough to recover them (e.g., because of frequent fiber cut).  \*Restoration: Calculates and sets backup path after failure occur.  \*1+1 protection: Calculates and sets backup path in advance.  \*1:1 protection: Calculates backup path in advance and sets backup path after failure occur**.** | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **6-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **6-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **6-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **6-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **6-2-4. Vendor** [Please choose 1]  Multi-vendor  Single-vendor |
| **6-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **7-1. Do you want to reduce backup resources** (e.g., No. of transport equipment, components and fibers) **by sharing backup resources among some active communications** (connections/paths) **using flexible and automatic recovery methods** (e.g., 1:N protection, restoration)**?**  \*Currently faults occur so frequently that you need many backup resources if you use 1+1/1:1 protection.  \*1:N protection: Shares backup resources with N active paths. | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **7-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **7-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **7-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **7-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **7-2-4. Vendor** [Please choose 1.]  Multi-vendor  Single-vendor |
| **7-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **8-1. Do you want to reduce necessary resources** (e.g., No. of transport equipment, components and fibers) **by using traffic optimization which can handle traffic fluctuation?**  \*Currently you need to prepare many resources which would not used immediately in advance for future traffic increase. | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **8-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **8-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **8-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **8-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **8-2-4. Vendor** [Please choose 1.]  Multi-vendor  Single-vendor |
| **8-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **9-1. Do you want to reduce time, cost and workload to deploy new network services?**  \*Currently you need much time, cost and workload to design network architecture, develop/test/deploy new equipment for new network services. | [Please choose 1.]  Very much  Quite a lot  A little  Not at all |
| **9-2. What is the environment of this issue?** *(If answer is "A little" and more and if possible.)* | **9-2-1. Network area** [Please choose 1.]  Metro/Aggregation network  Core backbone network  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **9-2-2. Layer** [Please choose 1.]  Multi-layer  Single-layer |
| **9-2-3. Technology of each layer** [Please choose all which apply to you.]  IP/MPLS  Ethernet  MPLS-TP  OTN  SDH  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **9-2-4. Vendor** [Please choose 1.]  Multi-vendor  Single-vendor |
| **9-2-5. Service** [Please choose all which apply to you.]  Fixed line (e.g., Telephone, Internet access, Video-streaming)  Mobile  Enterprise  Inter data center  Others [Please list them out]  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| *(If you have another environment, please copy the above and reply.)* |  |
|  | **Other issues.**  *(If you have.)* | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|  | **Which are your most three important issues?** | **No.1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **No.2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **No.3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

**Annex : Additional information**

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**THE QUESTIONNAIRE ON Requirements of Future Transport Network Technologies for Precision Time and Frequency Synchronization**

**Section 1: Elementary Part**

1. **Introduction:**

Synchronization technologies are widely used by telecommunications carriers around the world. Recently, in addition to requirements for frequency synchronization between network systems, the emergence in recent years of applications requiring time and phase synchronization with absolute time means that the areas in which synchronization technologies are applied are expanding. Time and phase synchronization technologies are anticipated for uses such as matching timing with electricity storage and supply in the smart grid, IoT/M2M, high frequency trading in the financial fields, cooperation applications between base stations for LTE-Advanced and 5G mobile technologies.

For the future, time/phase synchronization technologies will be deployed to achieve many network services and applications and become one of the essential technologies for Asian telecom operators as well.

1. **Objective of the Questionnaire:**

If telecom operators deploy the high precision time synchronization technologies to the transport network, we must consider some requirements and specifications depending on the use case and various deployment conditions.

Therefore, we would like to collect information and clarify the network synchronization requirements, actual deployment states and future plan in Asia telecom operator’s networks. And then, extracting the common requirements from each country’s information, we will make the APT report as the common specification and work on standardization activities for the future.

1. **Responsible Group:** EGFN/NGN
2. **Rapporteur of the Questionnaire:**

Kaoru Arai, NTT

Email: arai.kaoru@lab.ntt.co.jp

1. **Meeting at which the Questionnaire was approved:** ASTAP-27
2. **Target Responder:**

APT Members/Associate Members/Affiliate Members

If possible, transport network and mobile departments of APT telecom operators.

1. **Deadline for Responses:**  30th June, 2016

**Section 2: Questionnaire Part**

**Table of contents**

|  |  |
| --- | --- |
| **Question number** | **Question** |
| 1 | Current status and future plan |
| 2 | Use case of synchronization |
| 3 | Synchronization method |
| 4 | Problem of synchronization network operation |

**Question 1: Current status and future plan**

|  |  |  |
| --- | --- | --- |
| **No** | **Question** | **Answer** |
| 1-1 | Please list down your current deployment status of synchronization technologies | Frequency synchronization  Time/phase synchronization  None |
| 1-2 | Please list down your future deployment plan of synchronization technologies | Frequency synchronization  Time/phase synchronization  None |

**Question 2: Use case of synchronization**

|  |  |
| --- | --- |
| **Question** | **Answer** |
| What do you interested in use case of synchronization technology?  Please mark the use cases that are interesting. | TDM based network service  (e.g. PSTN, Leased line)  3G mobile technologies  4G-LTE mobile technologies  (e.g. CoMP, eICIC and CA)  5G future mobile technologies  Broadcast  Financial service (e.g. HFT)  Assisted car and self-driving car  Smart grid and smart community  Data center application  IoT/M2M (other than listed above)  Others  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

CoMP: Coordinated Multi-Point

eICIC: enhanced Inter-Cell Interference Coordination

CA: Carrier Aggregation

**Question 3: Synchronization method**

|  |  |
| --- | --- |
| **Question** | **Answer** |
| Please mark your interesting synchronization methods. | GNSS synchronization  SONET/SDH  Synchronous Ethernet (SyncE)  Precision Time Protocol (PTP)  Others  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Question 4: Problem of synchronization network operation**

What do you interested in problems regarding time synchronization network operation?

Please mark the degree of importance for each problem.

|  |  |
| --- | --- |
| **Problems** | **Answer** |
| Migration of existing synchronization network(e.g. changing from SONET/SDH and ATM networks to packet based network) | Very important  Quite important  Not quite important  Not very important |
| Maintenance of existing systems because of getting older and EoL | Very important  Quite important  Not quite important  Not very important |
| Comparison and selection of synchronization methods(e.g. technical advantages of GNSS and network based technologies such as PTP and SyncE, and cost-effective comparison) | Very important  Quite important  Not quite important  Not very important |
| Deployment of synchronization systems (e.g. update and adding the synchronization function to existing systems) | Very important  Quite important  Not quite important  Not very important |
| OPEX and CAPEX for synchronization network | Very important  Quite important  Not quite important  Not very important |
| Survey of new services and requirements of synchronization | Very important  Quite important  Not quite important  Not very important |
| Configuration of synchronization network (e.g. construction of synchronization path over main signal or dedicated synchronization path, and redundancy) | Very important  Quite important  Not quite important  Not very important |
| Failure of synchronization systems and GNSS | Very important  Quite important  Not quite important  Not very important |
| Operation and management of synchronization network | Very important  Quite important  Not quite important  Not very important |
| Other problems | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Free description**

**Please describe freely your opinion regarding high precision synchronization.**

**Annex A: Technical information**

We attach the information document including the important factors and the consideration issues to configure high precision time synchronization network.

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