Remote Calibration

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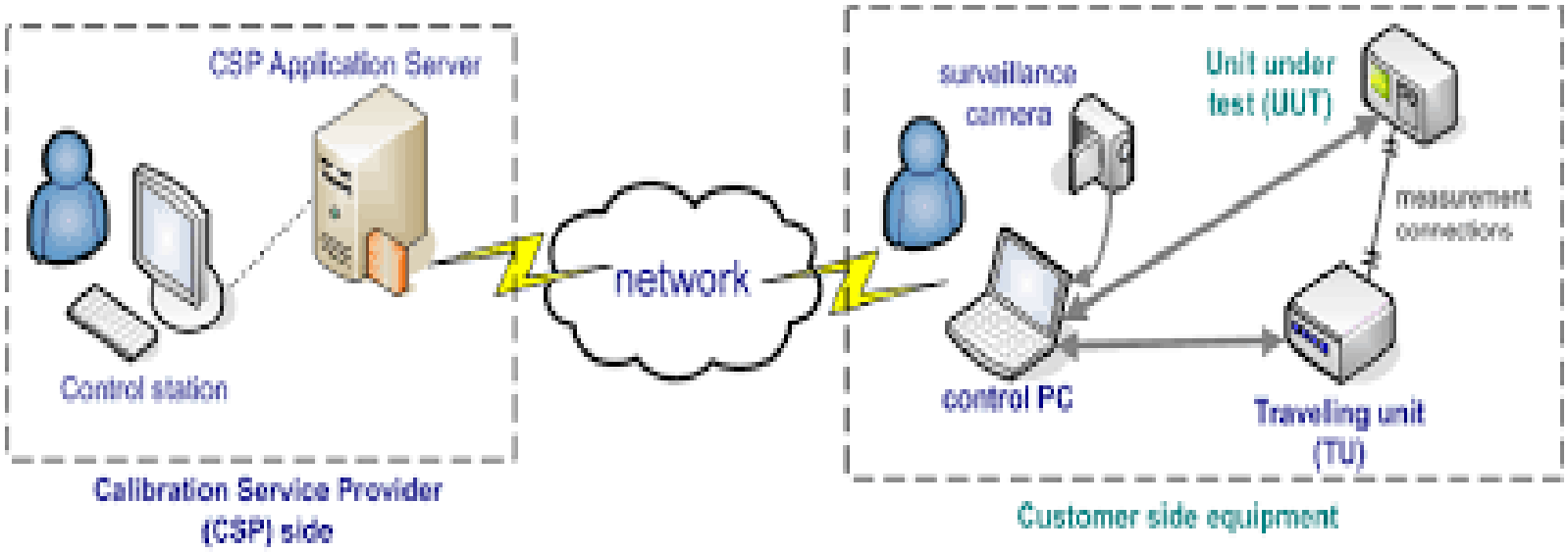
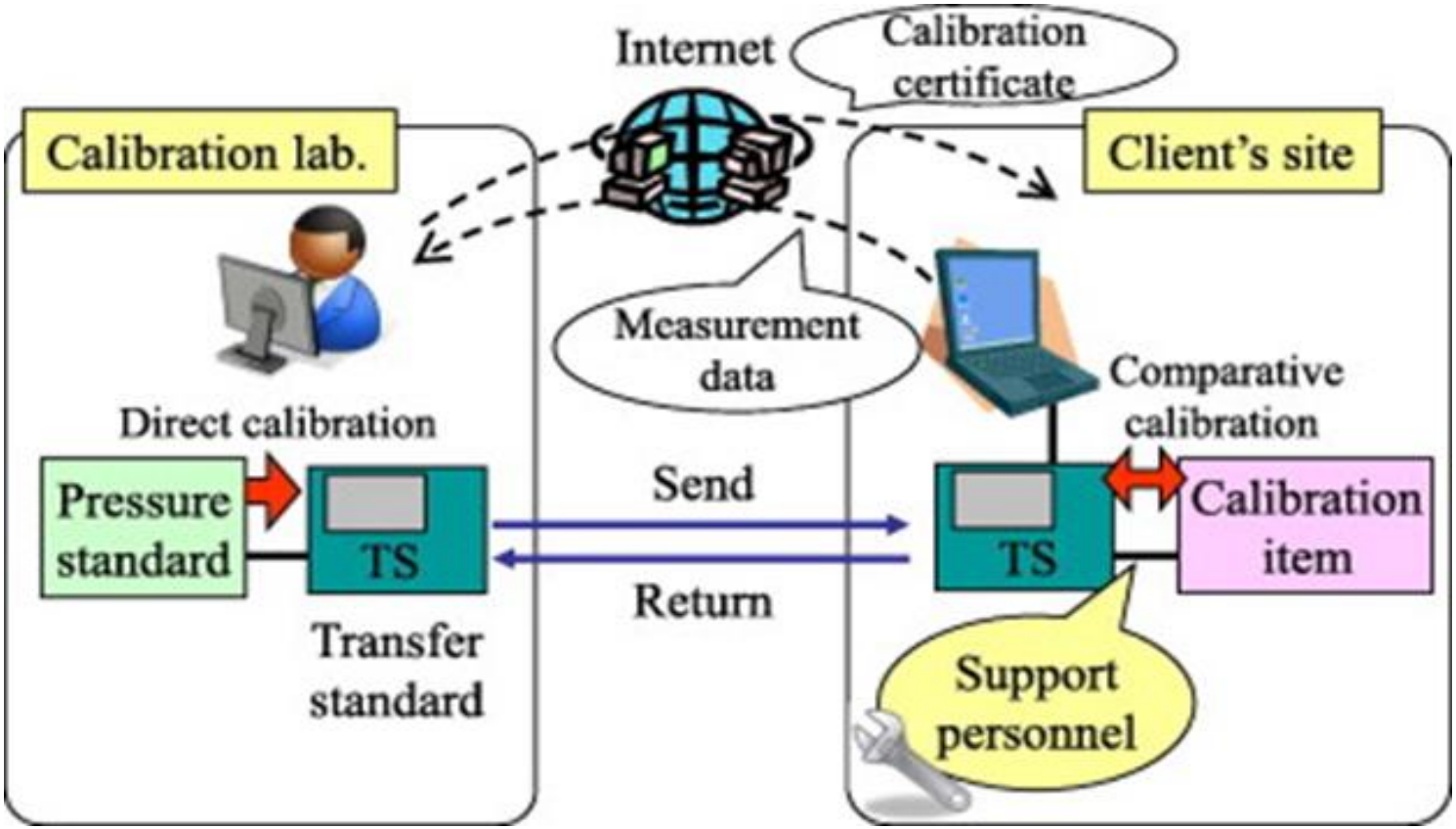
Remote Calibration

Measuring system 4.0 makes the remote calibration possible with less complexity.

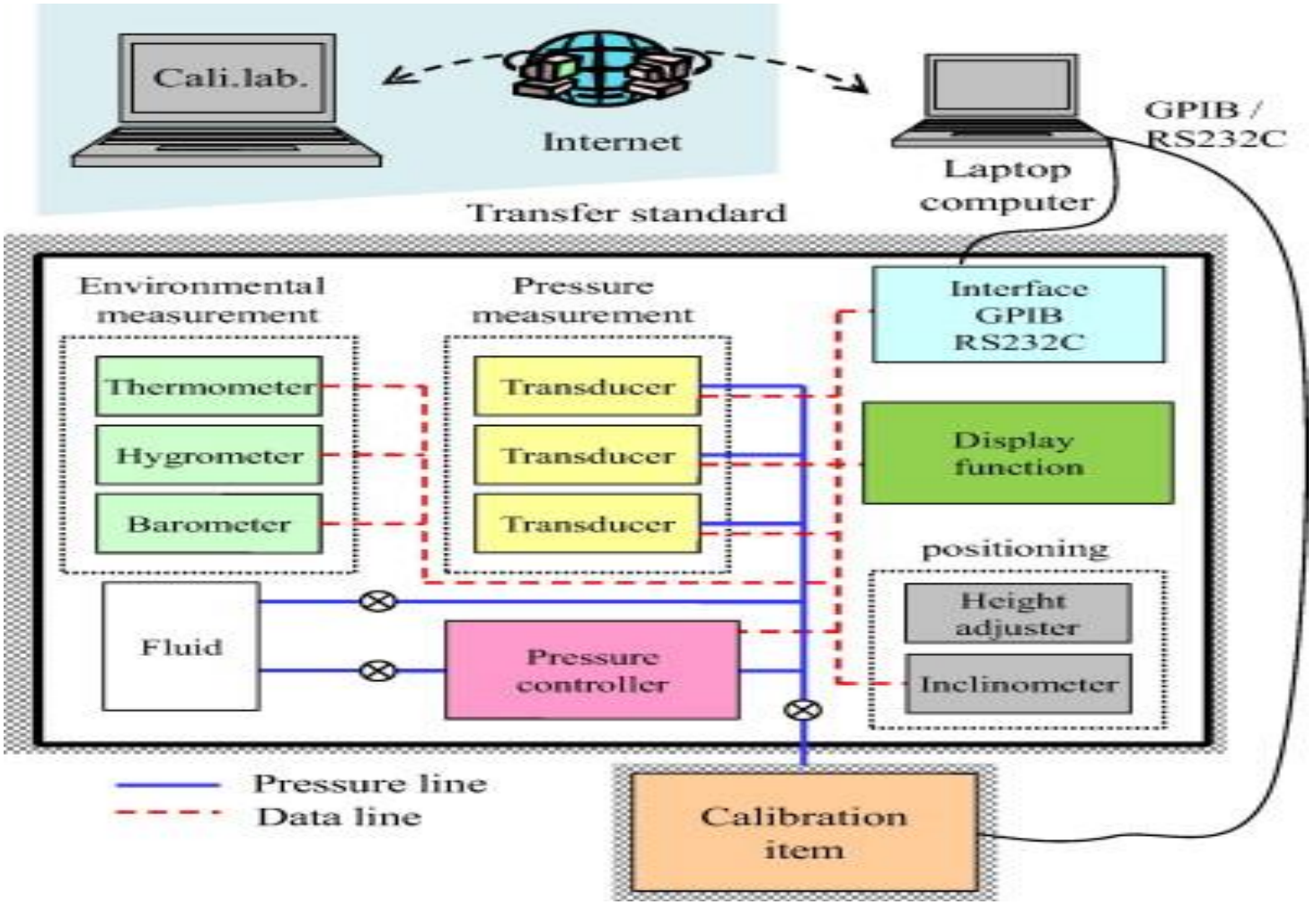
Remote Calibration Concept



Remote Calibration Conceptual Drawing



Remote Pressure Calibration by NMIJ



Data Acquisition Card Calibration

- An example system was implemented to provide the calibration of external USB DAQ card (National Instruments 6020E model).
- The travelling standard (TS) is the 6 ½ digit DMM (with a valid, traceable calibration certificate) connected over the GPIB interface to the PC.
- The TS measures the output signals from the DAQ during the verification of the board outputs. (U. of Zagreb, Croatia)

Remote Calibration

Calibration Service Provider, CSP (Accredited calibration lab.)

- Standard sources are transferred.

Calibration in industries

- Support personnel performs the measurement and data will be sent to CSP.
- Support personnel need to be well trained.
- Support facilities should be satisf with

Quality Document Guidelines

Organization

- The CSP should be responsible for ensuring that the entire remote calibration activities including support services comply with relevant requirements of ISO/IEC 17025.
- The CSP should clearly define the scope of its own activities and details of support services necessary to perform remote calibration.
- The CSP should clearly specify the responsibility, authority and interrelationships of all personnel, including support personnel, involved in the remote calibration activities.

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Organization (cont.)

- The remote calibration NMI should establish a management system to minimize the possibility of measurement data being influenced by its customers or support personnel.

Quality Document Guidelines

Management system and Document control

- Management system documentation should specify calibration activities and operations of equipment performed both at the main premises of a CSP and at an on-site facility.
- The CSP should provide support personnel with all operational procedures and work instructions necessary to enable them to provide support service correctly. It should make these documents available whenever support personnel need them.

Quality Document Guidelines

Contract review

- When the CSP receives a calibration request, it should notify the customer of any specific conditions that may be required for the on-site facility, performance of on-site equipment and, when necessary, details of preconditioning of the transfer device and relevant instruments. It should confirm whether such facilities and equipment are available and comply with the requirements stated.

Quality Document Guidelines

Contract reviews (cont.)

- When a remote calibration requires support services, the CSP should notify the customer and confirm whether the support service is to be provided by the customer or an external body. When the support service is provided by an external body, the remote calibration laboratory should exchange a contract for the support services with this body. This contract should be part of or referred to in the calibration contract with customers.

Quality Document Guidelines

Control of records

-When a computer is used to record calibration or measurement data, the CSP should carry out sufficient protection to ensure confidentiality so as to ensure that its customers do not have access to information about other customers.

- As necessary, the remote calibration laboratory should retain results of measurements taken at on-site facility together with related records such as measured environmental conditions.

Quality Document Guidelines

Support personnel

- When activities conducted by support personnel can have a significant impact on calibration results, the CSP should, prior to initiation of remote calibration, verify whether the support personnel are able to provide support services fulfilling the requirements of the remote calibration laboratory.
- The CSP should ensure that the support personnel are instructed, trained and have a suitable level of technical competence to provide support services.
- The CSP may train support personnel itself or delegate it to the customer or to another external body which provides support services.

Quality Document Guidelines

Support personnel (cont.)

- It is the responsibility of the CSP to ensure the competence of any such support services. An acceptable means of confirmation of competence is to demonstrate that support services are provided by a calibration laboratory accredited to ISO/IEC17025.

- The CSP should at least review records provided by the customer or other external body to evaluate whether support personnel are provided with appropriate guidance and training.

Quality Document Guidelines

Support personnel (cont.)

- Support personnel should not be permitted to deviate from the defined activities and processes. If CSP personnel find a need for a specific operation other than those written in the work instructions, support personnel may conduct such activities provided that special instructions are given by the CSP in a timely manner and that the performance of support personnel is monitored during the calibration. Consideration should be given to minimize the possibility of any future deviations.

Quality Document Guidelines

Calibration methods and their validation

- The CSP laboratory should validate methods of remote calibration that it uses.

- The CSP should evaluate calibration and measurement capabilities for remote calibrations. If CSP provides calibration services at its permanent facility and remote calibrations, it should estimate and claim the calibration and measurement capabilities for both types of calibration.

Quality Document Guidelines

Calibration methods and their validation (cont.)

- Uncertainty budgets should give considerations to sources of uncertainty specific to remote calibration. When necessary, the evaluation of on-site facility and on-site equipment should be performed at on-site facility prior to initiation of remote calibration. Also after completion of remote calibration, the CSP should, when necessary, visit the on-site facility and evaluate relevant support services provided.

Quality Document Guidelines

Control of data

-Throughout remote calibration activities, the CSP should be able to have appropriate access to data obtained at one-site facility. When acquisition and transmission of measured data is performed with computers and via the Internet, securities including authentication, access control, confidentiality, protection of data integrity and privacy protection should function appropriately and effectively.

Quality Document Guidelines

Metrological traceability

- When the CSP uses on-site equipment owned by the customer of other external bodies that significantly affects on the validity of the calibration results or uncertainty, it should ensure that all such equipment and instruments are properly calibrated and obtain their calibration certificate or data before and/or during remote calibration.

Quality Document Guidelines

Calibration certificate

- In addition to the general requirements for calibration certificate content, the certificate issued for remote calibration(s) should state that the calibration was performed remotely and indicate where the on-site facility is located.

- When a certificate for remote calibration is prepared in electronic format and is sent to customers via electronic means, appropriate precautions should be taken so as to ensure the integrity of the data during transmission.

References

- T. Kobata, et.al, “Towards Establishment of Remote Calibration for Pressure Standards”, IMEKO 20th, Nov. 2007
- APMP TCTF, “Guidelines for Remote Calibration”, 2011
- M. Jurcevic, “Generic Environment for internet-enabled calibration services”, www.researchgate.net, 2008