



## Internet of Things Technologies for the Efficient Collection of Hydrological Measurement Data

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The collection of hydrological measurement data comprises a broad range of challenges beyond the development and deployment of sensing devices. Especially the transmission of the collected (raw) data to central data servers may be a challenging task depending on the available infrastructure.

In our presentation we will discuss the applicability of Internet of Things (IoT) technologies to enable a lightweight data collection workflow relying on the Message Queuing Telemetry Transport (MQTT) protocol as well as the SensorThings API standard of the Open Geospatial Consortium (OGC). These standards are especially optimised to reduce communication overheads, to be viable via resource constrained communication links, and to support a seamless plug-and-play integration of new measurement devices.

As part of this presentation, we will introduce the communication patterns and messages used by the data collection mechanism. This will be combined with a discussion how these IoT standards can be coupled to existing sensor hardware and which types of communication link can be used. Afterwards, we will also discuss the design of a data management server that integrates the collected measurement data. This comprises on the one hand connectors to the IoT data streams but on the other hand also data management and storage functionality, as well as interoperable interfaces for sharing the collected data.

For the validation of the presented concept, a pre-operational deployment at the Wupperverband, a regional water management association in Germany, will be shown. This comprises not only the practical experiences gained during the operation but also recommendations on future challenges such as semantic interoperability (e.g. vocabularies) as well as the efficient management of large amounts of incoming time series data (e.g. via dedicated database concepts).

Thus, in summary our contribution aims to contribute to the discussion on how IoT technologies may help to facilitate the collection of hydrological measurement data and to support the sharing of such data.