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Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) —

Part 19: Weather information (TPEG2-WEA)

Systèmes intelligents de transport — Informations sur le trafic et le tourisme via le groupe expert du protocole de transport, génération 2 (TPEG2) —

Partie 19: Renseignements météorologiques (TPEG2-WEA)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition cancels and replaces the first edition (ISO/TS 21219-19:2016), which has been technically revised.

The main changes are as follows:

— the document has been changed from a Technical Specification to an International Standard;

— a NOTE and one new WeatherStatistics value have been added in Table 6.

A list of all parts in the ISO 21219 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 History

TPEG technology was originally proposed by the European Broadcasting Union (EBU) Broadcast Management Committee, who established the B/TPEG project group in the autumn of 1997 with a brief to develop, as soon as possible, a new protocol for broadcasting traffic and travel-related information in the multimedia environment. TPEG technology, its applications and service features were designed to enable travel-related messages to be coded, decoded, filtered and understood by humans (visually and/or audibly in the user's language) and by agent systems. Originally, a byte-oriented data stream format, which can be carried on almost any digital bearer with an appropriate adaptation layer, was developed. Hierarchically structured TPEG messages from service providers to end-users were designed to transfer information from the service provider database to an end-user's equipment.

One year later, in December 1998, the B/TPEG group produced its first EBU specifications. Two documents were released. Part 2 (TPEG-SSF, which became ISO/TS 18234-2) described the syntax, semantics and framing structure which was used for all TPEG applications. Meanwhile, Part 4 (TPEG-RTM, which became ISO/TS 18234-4) described the first application for road traffic messages.

Subsequently, in March 1999, CEN/TC 278, in conjunction with ISO/TC 204, established a group comprising members of the former EBU B/TPEG and this working group continued development work. Further parts were developed to make the initial set of four parts, enabling the implementation of a consistent service. Part 3 (TPEG-SNI, later ISO/TS 18234-3) described the service and network information application used by all service implementations to ensure appropriate referencing from one service source to another.

Part 1 (TPEG-INV, later ISO/TS 18234-1) completed the series by describing the other parts and their relationship; it also contained the application IDs used within the other parts. Additionally, Part 5, the public transport information application (TPEG-PTI, later ISO/TS 18234-5), was developed. The so-called TPEG-LOC location referencing method, which enabled both map-based TPEG-decoders and non-map-based ones to deliver either map-based location referencing or human-readable text information, was issued as ISO/TS 18234-6 to be used in association with the other applications of parts of the ISO 18234 series to provide location referencing.

The ISO 18234 series has become known as TPEG Generation 1.

0.2 TPEG generation 2

When the Traveller Information Services Association (TISA), derived from former forums, was inaugurated in December 2007, TPEG development was taken over by TISA and continued in the TPEG applications working group.

It was about this time that the (then) new Unified Modelling Language (UML) was seen as having major advantages for the development of new TPEG applications in communities who would not necessarily have the binary physical format skills required to extend the original TPEG TS work. It was also realized that the XML format for TPEG described within the ISO 24530 series (now superseded) had a greater significance than previously foreseen, especially in the content-generation segment, and that keeping two physical formats in synchronism, in different standards series, would be rather difficult.

As a result, TISA set about the development of a new TPEG structure that would be UML-based. This has subsequently become known as TPEG Generation 2 (TPEG2).

TPEG2 is embodied in the ISO 21219 series and it comprises many parts that cover an introduction, rules, toolkit and application components. TPEG2 is built around UML modelling and has a core of rules that contain the modelling strategy covered in ISO 21219-2, ISO 21219-3 and ISO 21219-4 and the conversion to two current physical formats: binary (see Annex A) and XML (see Annex B); others can be added in the future. TISA uses an automated tool to convert from the agreed UML model XMI file directly into an MS Word document file, to minimize drafting errors; this file forms the annex for each physical format.

TPEG2 has a three-container conceptual structure: message management (ISO 21219-6), application (several parts) and location referencing (ISO/TS 21219-7). This structure has flexible capability and can accommodate many differing use cases that have been proposed within the TTI sector and wider for hierarchical message content.

TPEG2 also has many location referencing options as required by the service provider community, any of which may be delivered by vectoring data included in the location referencing container.

The following classification provides a helpful grouping of the different TPEG2 parts according to their intended purpose. Note that the list below is potentially incomplete, as there is the possibility that new TPEG2 parts will be introduced after the publication of this document.

— Toolkit parts: TPEG2-INV (ISO 21219-1), TPEG2-UML (ISO 21219-2), TPEG2-UBCR (ISO 21219-3), TPEG2-UXCR (ISO 21219-4), TPEG2-SFW (ISO 21219-5), TPEG2-MMC (ISO 21219-6), TPEG2-LRC (ISO/TS 21219-7).

— Special applications: TPEG2-SNI (ISO 21219-9), TPEG2-CAI (ISO 21219-10), TPEG2-LTE (ISO/TS 21219-24).

— Location referencing: TPEG2-OLR (ISO/TS 21219-22), TPEG2-GLR (ISO/TS 21219-21), TPEG2-TLR (ISO 17572-2), TPEG2-DLR (ISO 17572-3).

— Applications: TPEG2-PKI (ISO 21219-14), TPEG2-TEC (ISO 21219-15), TPEG2-FPI (ISO 21219-16), TPEG2-SPI (ISO 21219-17), TPEG2-TFP (ISO 21219-18), TPEG2-WEA (ISO 21219-19 - this document), TPEG2-RMR (ISO/TS 21219-23), TPEG2-EMI (ISO/TS 21219-25), TPEG2-VLI (ISO/TS 21219-26).

TPEG2 has been developed to be broadly (but not totally) backward compatible with TPEG1 to assist in transitions from earlier implementations, while not hindering the TPEG2 innovative approach and being able to support many new features, such as dealing with applications with both long-term, unchanging content and highly dynamic content, such as parking information.

This document is based on the TISA specification technical/editorial version reference:

SP20014/1.2/001.

Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) —

Part 19: Weather information (TPEG2-WEA)

1 Scope

This document defines the TPEG Weather (WEA) application for reporting weather information for travellers. It provides general weather-related information to all travellers and is not limited to a specific mode of transportation.

This application does not provide specific weather-related safety warnings to drivers; these are provided as safety related messages as part of the TPEG2-TEC application (ISO 21219-15).

The WEA application provides weather-related forecasts and status information over multiple time periods and for multiple, possibly linked, geographical areas.

NOTE The presentation of the information is dependent on the specific human-machine interface (HMI) of the receiving device. Therefore, this document does not define any prerequisites for the HMI of the device.

This document contains examples to help explain how some typical weather reports can be signalled (see Annex C) and suggested translations between WEA table codes and WMO SYNOP weather observation codes (see Annex D).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21219-1, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 1: Introduction, numbering and versions (TPEG2-INV)*

ISO 21219-9, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 9: Service and network information (TPEG2-SNI)*

ISO 21219-14, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 14: Parking information (TPEG2-PKI)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21219-9 and ISO 21219-14 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO 21219-1, ISO 21219-9, ISO 21219-14 and the following apply.

AQI air quality index

HMI human-machine interface

RF radio frequency

SYNOP surface synoptic observations

UV ultraviolet

UVI UV Index

WHO World Health Organization

WMO World Meteorological Organization

5 Application specific constraints

5.1 Application identification

The word “application” is used in the TPEG specifications to describe specific subsets of the TPEG structure. An application defines a limited vocabulary for a certain type of messages, for example, parking information or road traffic information. Each TPEG application is assigned a unique number, called the application identity (AID). An AID number is defined in ISO 21219-1 whenever a new application is developed.

The AID number is used within the TPEG2-SNI application (ISO 21219-9) to indicate how to process TPEG content. It facilitates the routing of information to the appropriate application decoder.

5.2 Version number signalling

Version numbering is used to track the separate versions of an application through its development and deployment. The differences between these versions can have an impact on client devices.

The version numbering principle is defined in ISO 21219-1.

Table 1 shows the current version numbers for signalling WEA within the SNI application.

Table 1 — Current version numbers for signalling of WEA

Major version number	1
Minor version number	2

5.3 Ordered components

TPEG2-WEA requires a fixed order of TPEG components. The order for the WEA message component is shown in Figure 1. The first component shall be the MMC. This shall be the only component if the message is a cancellation message. Otherwise, the MMC component shall be followed by the one or more ADC component(s) which includes the application-specific information.

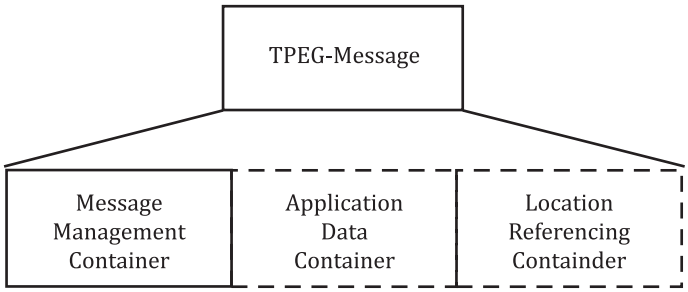


Figure 1 — Composition of TPEG messages

5.4 Extendibility

The requirement of a fixed component order does not affect the extension of WEA. Future application extensions may insert new components or may replace existing components by new ones without losing backward compatibility. That means a WEA decoder shall be able to detect and skip unknown components.

5.5 TPEG service component frame

WEA makes use of the "service component frame with dataCRC and messageCount" according to TPEG2-SFW specified by ISO 21219-5.

6 WEA structure

WEA message structure is shown in Figure 2. The binary format and XML format of the TPEG2-WEA application for use in transmission shall be in accordance with Annexes A and B, respectively.

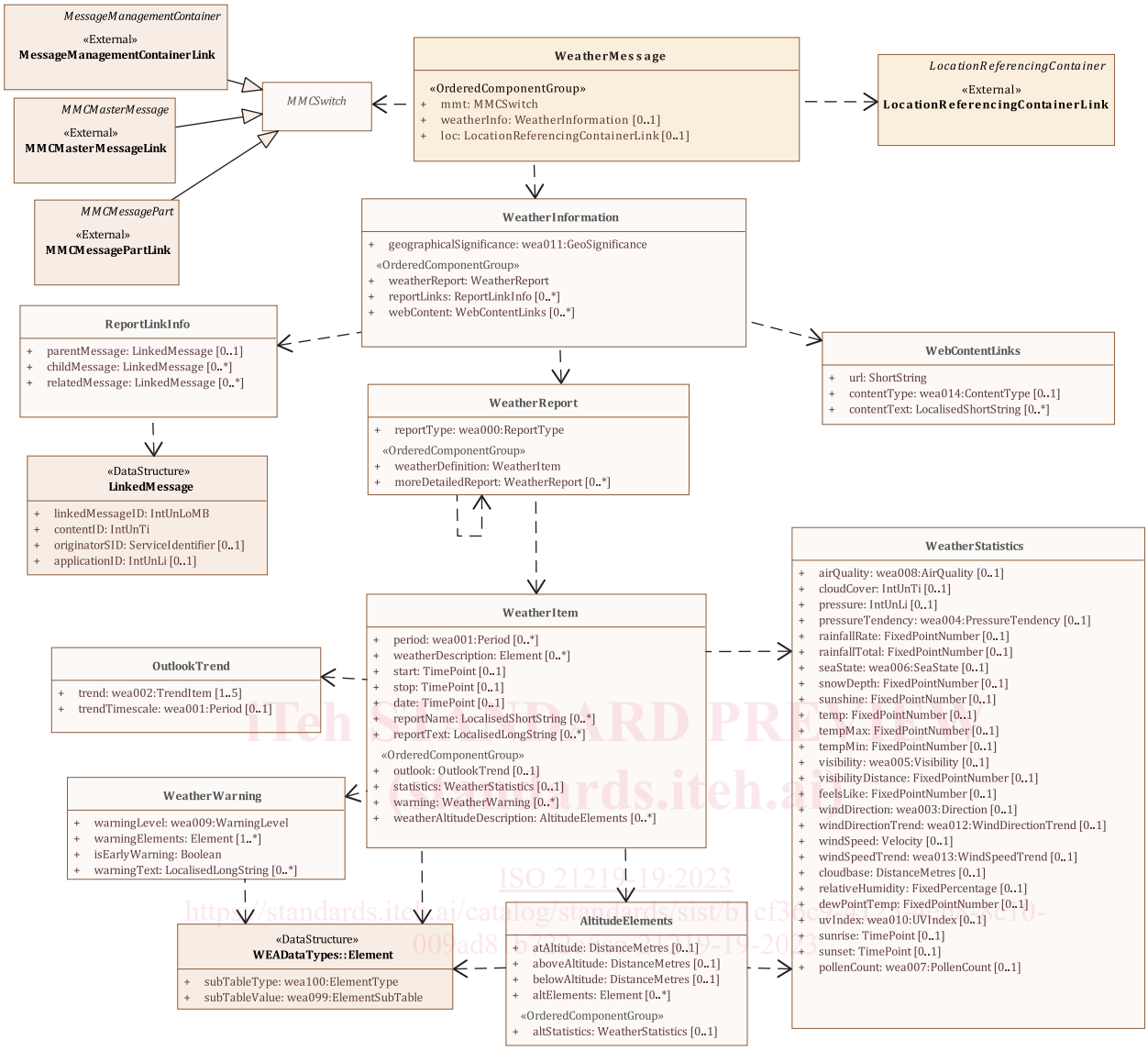


Figure 2 — WEA message structure

7 WEA message components

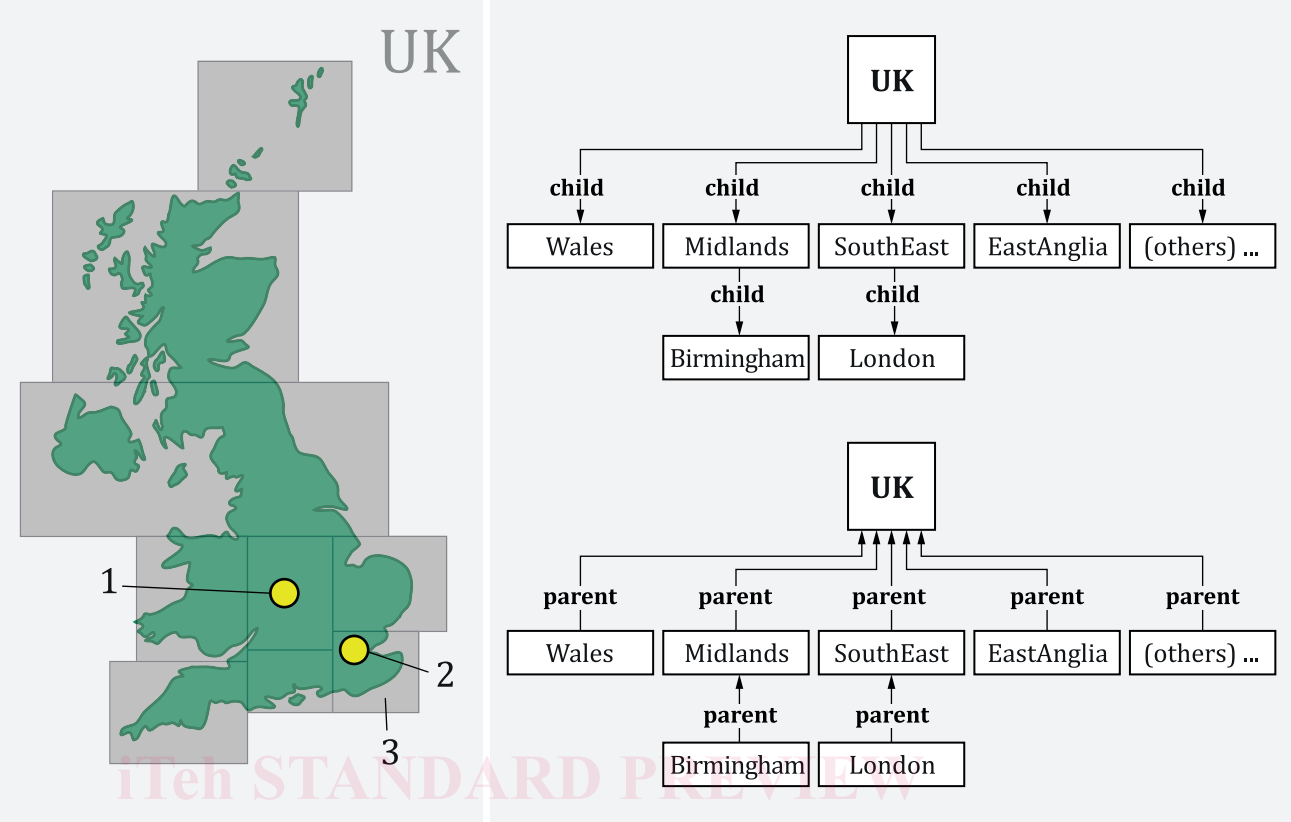
7.1 General

The WEA application provides a flexible message interface for distribution of weather information.

To enable multiple levels of detail to be signalled, WEA provides two different hierarchal structures to allow messages to cover multiple geographical areas and also to cover different time periods. Messages may be linked to each other to provide a geographical hierarchy of the weather reports which can be exploited by receivers to help users find the messages they need.

EXAMPLE A UK service can provide a national overview, with regional reports and individual city reports.

Individual messages are linked by child and parent message IDs by linking individual messages in a child/parent relationship. A message can only have 1 parent but can have multiple child messages, as shown in Figure 3.



Key

1 Birmingham
2 London
3 South East England

Figure 3 — Location hierarchy

7.2 WeatherMessage

Each WEA message is associated with a single location and contains one or more weather reports (excluding the case of a cancellation). The structure of a WeatherMessage is presented in Figure 4, and the encoding of a WeatherMessage is shown in Table 2.

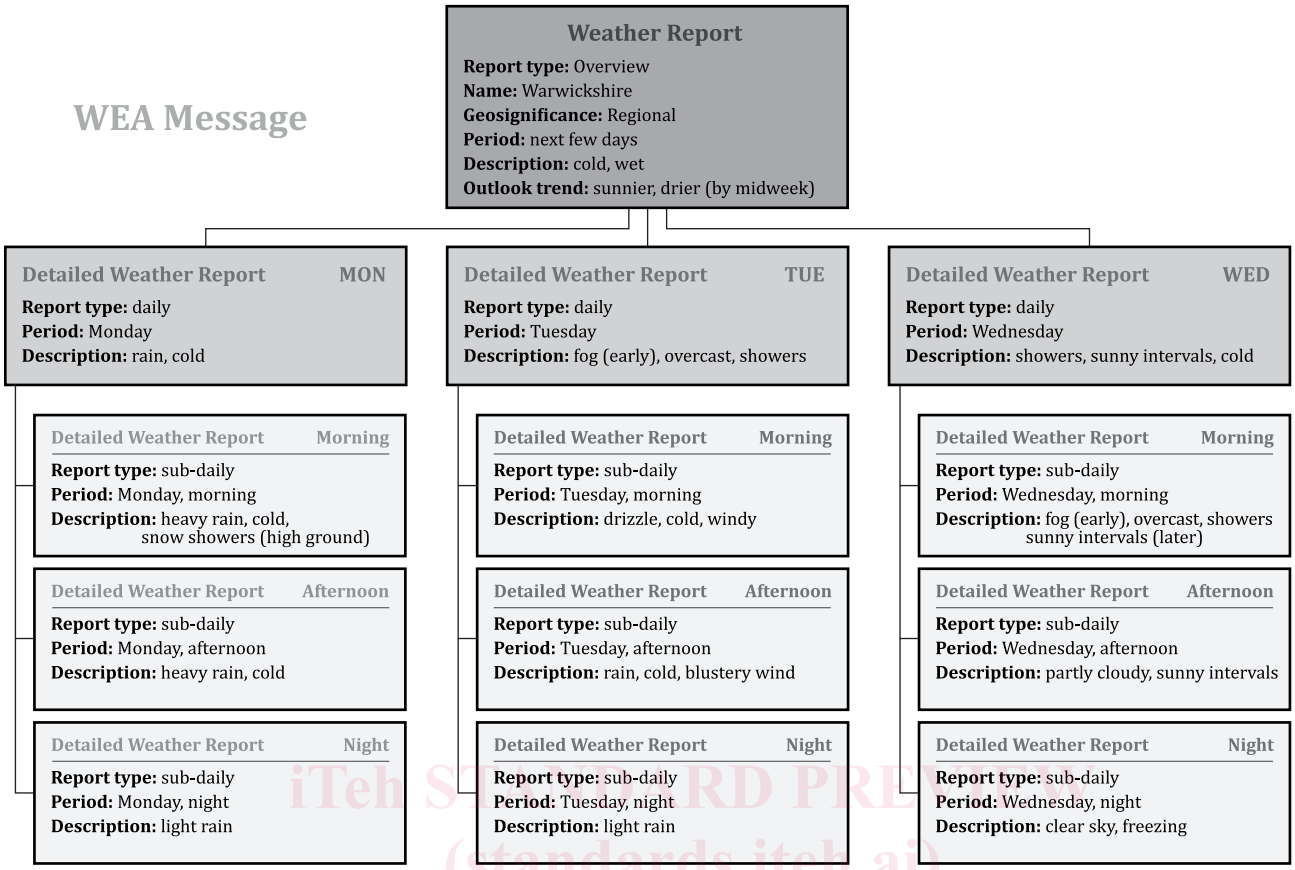


Figure 4 — Sample WEA message with different timescales covered

Table 2 — WeatherMessage

Name	Type	Multiplicity	Description
Ordered components			
mmt	MMCSwitch	1	MMC
weatherInfo	WeatherInformation	0..1	Weather information (always included except for cancellation of a message).
loc	LocationReferencingContainerLink	0..1	LRC (always included except for cancellation of a message).

7.3 WeatherInformation

A weather report can be either a simple single level report or can be made into a hierarchy of reports associated to increasingly smaller time periods. The encoding of WeatherInformation is shown in Table 3.

Table 3 — WeatherInformation

Name	Type	Multiplicity	Description
geographicalSignificance	wea011:GeoSignificance	1	Defines the geographical significance or "spatial extent" of the report.
Ordered components			

Table 3 *(continued)*

Name	Type	Multiplicity	Description
weatherReport	WeatherReport	1	Contains the report data, defines what type of period it covers and gives additional, more detailed reports for smaller time periods if required.
reportLinks	ReportLinkInfo	0..*	Links to related WEA reports or other TPEG messages.
webContent	WebContentLinks	0..*	Allows linkage to web-based content.

7.4 WeatherReport

The WeatherReport component provides the top level WeatherItem of the report and allows subsequent lower levels to be defined. A multiple level hierarchy of time periods may be defined. Different timescales are covered within a specific message by use of the different levels of Report (using the reportType). The encoding of a WeatherReport is shown in Table 4.

Table 4 — WeatherReport

Name	Type	Multiplicity	Description
reportType	wea000:ReportType	1	Defines the time “extent” of a report.
Ordered components			
weatherDefinition	WeatherItem	1	Main details of weather report.
moreDetailedReport	WeatherReport	0..*	Optional next-level report.

7.5 WeatherItem

The WeatherItem component defines the main content for the weatherReport, including descriptive and statistical parts. The encoding of a WeatherItem is shown in Table 5.

Table 5 — WeatherItem

Name	Type	Multiplicity	Description
period	wea001:Period	0..*	This provides an optional period for the report.
weatherDescription	Element	0..*	Weather description provides a qualitative description for the weather report. Any number of elements can be selected from the element tables.
start	TimePoint	0..1	Start defines the specific time of day at which the period of this weather report item begins. Typically, hours and minutes. If Stop is not defined, then Start is used to define a nominal time of the report. For example: 2 pm sunny; 4 pm rain; 6 pm showers, sunny intervals.
stop	TimePoint	0..1	Stop defines the explicit end time of the period for the weather item.
date	TimePoint	0..1	This provides the ability to report the main date for a report (suitable for a daily forecast). Typically, date or date and month.