LPP Network Trace Format

Abstract

This document describes the format of Link Performance Prediction (LPP) network trace file.

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# Introduction

This document describes the format of Link Performance Prediction (LPP) network trace file, aka ntrace file.

The intent is to have flexible and extensible format that contains series of location and bandwidth data.

This documentation along with network emulator and trace capture tools as well as traces can be found under GNU GPL 2.0 license at www.github.com/intel/lpp-network-trace

# Document history

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Version** | **Name** | **Description** |
| 2020-10-01 | 0x01 | Jonas Svennebring & Marcin Wierzbicki | Initial version. |

# Conventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

# 

# Trace format

The trace file is based on a JSON structure with a header and a payload.

## Header

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Description** | **Mandatory** |
| version | integer | Format version (possible values: 1) | Yes |
| description | string | Trace description (e.g. “From Stockholm to Szczecin”) (min length: 1, max length: 256) | Yes |
| clientModel | string | Client model (e.g. “SM-G390”) (max length: 128) | No |
| clientName | string | Client name (e.g. “Samsung Galaxy S10”) (max length: 128) | No |
| note | string | additional description, eg. name of network, link test server. (max length: 512) | No |

## Entry

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Description** | **Mandatory** |
| entryNo | integer | Trace entry number in ascending order (minimum value: 1) | Yes |
| dateTime | string | UTC timestamp in format “YYYY-MM-DDThh:mm:ssTZD” according to ISO 8601 (e.g.  1997-07-16T19:20:30+01:00, 1997-07-16T19:20:30Z) | Yes |
| network | string | Network operator name or the numeric name (MCC+MNC) (max length: 128) | No |
| dlBw | integer | Downlink bandwidth in kpbs | No |
| dlLatency | integer | Downlink latency to first bytes in microseconds | No |
| ulBw | integer | Uplink bandwidth in kpbs | No |
| ulLatency | integer | Uplink latency to first bytes in microseconds | No |
| latitude, longitude, accuracy | double, double, double | GPS latitude, longitude in decimal degrees (DD) in WGS-84 format, accuracy in meters | No |
| note | string | Additional description (max length: 512) | No |

*Note 1:* minimum number of entries is 2

*Note 2*: entryNo – value must be ascending for subsequent entries

*Note 3*: dateTime – must be greater for subsequent entries

## 

## Trace schema in JSON

|  |
| --- |
| {  "$schema": "http://json-schema.org/draft-07/schema#",  "$id": "http://example.com/product.schema.json",  "title": "LPP trace schema",  "description": "Link Performance Prediction trace file schema",  "type": "object",  "properties": {  "version": {  "description": "Format version",  "type": "integer",  "enum": [  1  ]  },  "description": {  "description": "Trace description (e.g. \"From Stockholm to Szczecin\")",  "type": "string",  "minLength": 1,  "maxLength": 256  },  "clientModel": {  "description": "Client model (e.g. \"SM-G390\")",  "type": "string",  "maxLength": 128  },  "clientName": {  "description": "Client name (e.g. \"Samsung Galaxy S10\")",  "type": "string",  "maxLength": 128  },  "note": {  "description": "additional description",  "type": "string",  "maxLength": 512  },  "entries": {  "description": "Trace entries",  "type": "array",  "uniqueItems": true,  "contains": {  "type": "object"  },  "minItems": 2,  "maxItems": 5000,  "items": {  "type": "object",  "properties": {  "entryNo": {  "description": "Trace entry number in ascending order",  "type": "integer",  "minimum": 1  },  "dateTime": {  "description": "UTC timestamp in format \"YYYY-MM-DDThh:mm:ssTZD\" according to ISO 8601",  "type": "string",  "pattern": "^(-?(?:[1-9][0-9]\*)?[0-9]{4})-(1[0-2]|0[1-9])-(3[01]|0[1-9]|[12][0-9])T(2[0-3]|[01][0-9]):([0-5][0-9]):([0-5][0-9])(.[0-9]{3})?(?:Z|[+-][01][0-9]:[0-5][0-9])?$"  },  "network": {  "description": "Network operator name or the numeric name (MCC+MNC)",  "type": "string",  "maxLength": 128  },  "dlBw": {  "description": "Downlink bandwidth in kpbs",  "type": "integer",  "minimum": 0  },  "dlLatency": {  "description": "Downlink latency to first bytes in microseconds",  "type": "integer",  "minimum": 0  },  "ulBw": {  "description": "Uplink bandwidth in kpbs",  "type": "integer",  "minimum": 0  },  "ulLatency": {  "description": "Uplink latency to first bytes in microseconds",  "type": "integer",  "minimum": 0  },  "gpsCoordinates": {  "description": "A geographical coordinate",  "type": "object",  "properties": {  "latitude": {  "description": "GPS latitude in decimal degrees (DD) in WGS-84 format",  "type": "number"  },  "longitude": {  "description": "GPS longitude in decimal degrees (DD) in WGS-84 format",  "type": "number"  },  "accuracy": {  "description": "GPS accuracy of the latitude and longitude in meters.",  "type": "number"  }  },  "required": [ "latitude", "longitude" ]  },  "note": {  "description": "Additional description",  "type": "string",  "maxLength": 512  }  },  "anyOf": [  {  "required": [  "entryNo",  "dateTime",  "dlBw"  ]  },  {  "required": [  "entryNo",  "dateTime",  "ulBw"  ]  },  {  "required": [  "entryNo",  "dateTime",  "gpsCoordinates"  ]  }  ]  }  }  },  "required": [  "version",  "description",  "entries"  ]  } |

### JSON file examples

|  |
| --- |
| {  "clientModel": "SM-G390",  "note": "additional description",  "version": 1,  "description": "trip from Paris to London",  "entries": [  {  "entryNo": 1,  "dateTime": "2012-04-23T18:25:43.511Z",  "ulBw": 3000  },  {  "entryNo": 2,  "dateTime": "2012-04-23T18:27:00.000Z",  "ulBw": 25000  }  ]  } |

|  |
| --- |
| {  "version": 1,  "description": "trip from Szczecin to Warsaw",  "clientModel": "SM-G390",  "clientName": "Samsung Galaxy",  "note": "some more info",  "entries": [  {  "entryNo": 1,  "dateTime": "2012-04-23T18:25:43.511Z",  "network": "Plus",  "gpsCoordinates": {  "latitude": 48.858264489795047,  "longitude": 2.2945318624928879,  "accuracy": 10  },  "note": "park"  },  {  "entryNo": 2,  "dateTime": "2012-04-23T18:30:43.511Z",  "network": "Plus",  "dlBw": 45000,  "dlLatency": 20,  "ulBw": 2500,  "ulLatency": 0,  "note": "subway station 1"  },  {  "entryNo": 3,  "dateTime": "2012-04-23T20:30:43.511Z",  "network": "Plus",  "dlBw": 3000,  "note": "subway station 2"  }  ]  } |

# 

# References