



SURF Feed Technical Specification

Feed Content

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Related Documents

This document should be read in conjunction with the following documents:-

SURF Datasets	- a list of all data available
SURF Supporting Information	- notes giving background Market information
SURF Master Field List	- a (computer readable) list of all fields that can exist in SURF
SURF Stub Field List	- a (computer readable) list of fields per Record Stub
SURF Implementation SURF	- details of how to connect to the feed.
Encryption Guide	- only required if live running over the public Internet

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Contents

Feed Content	2
Related Documents	2
Confidentiality	2
Ownership	2
Contact Details	3
Acknowledgements	3
Data Feed Description	5
General Comments	5
Message Protocol	5
Feed Integrity	6
Heartbeats	6
Availability of Prices	6
Message Framing	6
Communications Protocol	6
Session Protocol	6
Message Formats	7
Record Type 340 - full image update	7
Record Type 316 - partial update	8
Record Type 318 - verify record	9
Record Type 407 - status record	10
Feed Handler Pseudo code	11
Initialisation	11
Reading records (using select)	11
Reading records (without select)	11
Extracting an input record	11
Decoding SURF	11
Presentation	12
Chain Records	12
Pages	12
Partial Field Updating	12
Character/Space Compression	13
Data Representation	13
Record Names/Record Stubs	13
Field Identification	13
Appendix A - Sample Stubs & Records	14
A.1 Sample Stubs	14
A.2 Example Spot Record	14
A.3 Example Chain Record	15
Appendix B: Data Codes	16
B.1 SURF Master Field List	16
B.2 SURF Stub and Field List	16
Appendix C - Reference Data	17
C.1 Currency	17
C.2 Period	18
C.3 Country	18

Data Feed Description

General Comments

The Tullett Prebon Information Ltd SURF (Single Unified Record Feed) feed is designed to deliver CST plc prices in a reliable and auditable form to all clients. The feed is delivered as a broadcast data stream over TCP/IP connections.

Message Protocol

SURF is heavily based on Reuters Marketfeed protocol. It is a subset of the Marketfeed protocol aimed at delivering data as simply and as efficiently as possible. It is intended that existing Marketfeed handlers will be able to read SURF with minimal alteration.

SURF outputs 4 message types consistent with Reuters Marketfeed:-

Record Type 340	- a full image record
Record Type 316	- a partial update (i.e. some fields changed)
Record Type 318	- a verify record
Record Type 407	- a status response with a code 29 'load complete'.

Each distinct record (with the exception of the status response) is identified by a unique Record Name, a 1 - 17 character field that is sent in the header of each message. The first time the SURF system generates a new record, all the fields defined for the Record will be sent using a full image message (340). Note that the client system will potentially see most new records at logon time via 318 records (see below). 340 records will only be seen if the client is connected the very first time SURF generates the record.

When changes occur to any Record that has already been sent , only those fields that have changed will be sent to the client in a partial update record (316).

As the feed is broadcast only, there will be an optional 'periodic refresh' facility. This will send full image records to a client every 'n' seconds which the client could use to check the last update received and/or restore their CST 'dataset'. This data will be sent using a verify record (318).

In addition to the optional periodic refresh, there is an optional 'Logon Refresh'. The Logon Refresh sends all permissioned data to the connecting client via verify records (318) as quickly as possible after connection has been established. When the Logon Refresh is completed the client is sent a record type 407 with a code 29.

The time and date of the last update to a record will be reflected in the Fields 5 (format hh:mm) and 17 (format dd-mmm-yyyy) respectively. Any client receiving the SURF update messages (Record Type 316) should update these fields with the date and time of their own receiving system.

Feed Integrity

As the feed is broadcast there is no way for a client to re-request or verify data. SURF utilises an update numbering mechanism so that clients can detect problems when receiving the broadcast data stream. The data update messages (340, 316 and 318) contain a sequence number field (RTL - Record Transaction Level), which is incremented each time a Record is updated. When a client receives a 340 or 316 message the RTL field should be 1 higher than the existing value for that record.

A verify message (318) contains the current RTL value and is not incremented.

The RTL field is modulus 65535, returning to 1 (not zero)

Heartbeats

In order that clients can be assured that there are no communication problems and that the feed is available a heartbeat record will be transmitted every 2 minutes. The Heartbeat record is a standard record named HBHHH (Heartbeat)

Availability of Prices

In the event of there being no price, bid, ask or both, or where it would be misleading to the market to quote an indicative price, the relevant price fields will contain spaces.

Recipients of the feed should clear the last price(s) from their displays and wait receipt of the next quotation

Message Framing

In order to simplify the extraction of Marketfeed records from a data stream, each record will be preceded with four ASCII characters giving the length of the record that follow. Thus, if the Marketfeed record is 355 characters long, then the message begins with "0355".

Communications Protocol

The feed will be delivered over a TCP/IP connection. Flow control is implicit in the TCP/IP specification.

Session Protocol

For simplicity, the feed is supplied as a broadcast. As soon as the connection is made, data will begin to flow to the client. There are no messages sent from the client end of the connection.

Message Formats

Record Type 340 - full image update

The records will be in standard Marketfeed format, i.e., a header followed by a sequence of Field / value pairs. All the values, except the separators are in ASCII. The header is shown in the following table:-

Field	Length	Notes
<FS>	1	Hex 1C
Record type	3	340 .
<US>	1	Hex 1F
XX	2	Tag - XX- unsolicited messages
<GS>	1	Hex 1D
RIC	1-17	Record Name
<US>	1	Hex 1F
<US>	1	Hex 1F
RTL	5	Sequence number between 1 and 65535

Each item of record data is sent as four repeating fields:

Field	Length	Notes
<RS>	1	Hex 1E
Field	1-4	Field identifier - ASCII numeric characters
<US>	1	Hex 1F
Value	0-	As many characters as necessary

These will be repeated for each field in the record.

The message is terminated by a single FS character, following the last value.

An example of a Spot Euro USD update with Bid and Ask fields:-

<FS>340<US>XX<GS>MMSPTEUR<US><US>11112<RS>22<US>0.9230<RS>25<US>0.9240<FS>

Record Type 316 - partial update

The records will be in standard Marketfeed format, i.e., a header followed by a sequence of Field / value pairs. All the values, except the separators are in ASCII. The header is shown in the following table

Field	Length	Notes
<FS>	1	Hex 1C
Record type	3	316
<US>	1	Hex 1F
XX	2	Tag - XX- unsolicited messages
<GS>	1	Hex 1D
Record ID	1-17	Record Name
<US>	1	Hex 1F
RTL	5	Sequence number between 1 and 65535

Each item of record data is sent as four repeating fields:

Field	Length	Notes
<RS>	1	Hex 1E
Field ID	1-4	Field identifier - ASCII numeric characters
<US>	1	Hex 1F
Value	0-	As many characters as necessary

These will be repeated for each field in the record.

The message is terminated by a single FS character, following the last value.

An example of a Spot Euro USD update with only a Bid field:-

<FS>316<US>XX<GS>MMSPTEUR<US>11113<RS>22<US>0.9235<FS>

Record Type 318 - verify record

The records will be in standard Marketfeed format, i.e., a header followed by a sequence of Field / value pairs. All the values, except the separators are in ASCII. The header is shown in the following table

Field	Length	Notes
<FS>	1	Hex 1C
Record type	3	318
<US>	1	Hex 1F
XX	2	Tag - XX- unsolicited messages
<GS>	1	Hex 1D
Record ID	1-17	Record Name
<US>	1	Hex 1F
<US>	1	Hex 1F
RTL	5	Sequence number between 1 and 65535

Each item of record data is sent as four repeating fields:

Field	Length	Notes
<RS>	1	Hex 1E
Field ID	1-4	Field identifier - ASCII numeric characters
<US>	1	Hex 1F
Value	0-	As many characters as necessary

These will be repeated for each field in the record.

The message is terminated by a single FS character, following the last value.

An example of a Spot Euro USD record with Bid and Ask fields:-

<FS>318<US>XX<GS>MMSPTEUR<US><US>11113<RS>22<US>0.9235<RS>25<US>0.9240<FS>

Record Type 407 - status record

The record type 407 will only appear if/when a client has been configured to receive a 'Logon Refresh' . When a client first connects all data that that client is permissioned for will be immediately transmitted as full image records (record type 340). During this refresh update records (record type 316) may be interspersed as data changes. When the refresh is complete SURF will transmit a record type 407 with a code of 29 to indicate that the refresh is complete.

Field	Length	Notes
<FS>	1	Hex 1C
Record type	3	407
<US>	1	Hex 1F
XX	2	Tag - XX- unsolicited messages
<GS>	1	Hex 1D
Code	1-3	29
<RS>	1	Hex 1E
Text	variable	"Logon Refresh Complete"
<FS>	1	Hex 1C

An example of a 'Logon Refresh Complete' message:-

```
<FS>407<US>XX<GS>29<RS>Logon Refresh Complete<FS>
```

Feed Handler Pseudo Code

The following pseudo-code highlights the main requirements.

Initialisation

Create an IP stream socket. Set up the socket address to refer to the server host name and port number.

Connect the socket.

Note also that as the output is a broadcast stream, the feed handler may just wait for data to arrive. This is known as doing a blocking read.

If, however, the data must be passed to another system; then it may be necessary to use I/O multiplexing. This allows the program to be notified when there is data available to be read. On UNIX, this is implemented using the select system call. In this case, the handle of the input port or socket is used to set up a mask for the select command.

Reading records (using select)

Enter a loop and issue the select command. This will only return when input port is readable. At this point, any data available may be read into a local buffer.

Reading records (without select)

Enter a loop and perform blocking read on the input channel. When data is available, it will be placed in to a local buffer and the read command will return.

Extracting an input record

TCP/IP protocol does not recognise record boundaries, so the input buffer may contain part of a record, a complete record and part of the next or multiple records.

To extract the SURF record:-

1. Read exactly four bytes from the port into a buffer.
2. Convert these four bytes from ASCII to an integer, recLen.
3. Read exactly recLen bytes from the port into the record buffer.
4. If less than recLen bytes are currently available to be read, either do a blocking read to wait for the remainder of the record, or wait for the next read event. In either case, it is necessary to append to the record buffer, and only to read those bytes remaining.
5. When the required number of bytes have been read, the Marketfeed record can be processed.
6. If necessary (if connected live via the public internet), decrypt the message (Refer to the SURF Encryption Guide for further details).

Decoding SURF

From the message header, it will be necessary to extract the record type and the Record Name.

The record type follows the FS character; it is terminated by the US character.

The Record name is the ASCII string between the GS and US separators.

Access the data as follows:

1. Scan for the RS character
2. Extract the ASCII string containing the Field ID from the RS until the US characters
3. Extract the ASCII value from between the US and either the next RS or the end of the record
4. Repeat until the end of the record is reached

Presentation

In addition to the standard delivery of single records SURF has the capability to present chains and pages of data.

Chain Records

Marketfeed provides a facility to chain records together. The record names have 0# 1# 2# as the first characters of the RIC name and contain the name of up to 14 other Record Names.

TPI does not intend to use this facility in the first release of SURF but may use it in the future. In order to provide suitable testing/development facilities a test 'ALLSPOTS' set of chain Records will exist on the all test feeds. I.e. Records 0#ALLSPOTS, 1#ALLSPOTS, 2#ALLSPOTS will be available for Clients to test their chain decoding software.

Pages

SURF will support 80x25 Page displays only (not 64x14). The implementation will be as Marketfeed and support partial field updates and character (space) compression in the specific Page FIDs Row80_1 ...Row80_25 (FIDs 315 to 339 inclusive). Field Id 1050 is used to identify that this record is a page by setting the character 'P' in the field.

Partial Field Updating

FIDs 315 through 339 represent the 25 rows on an 80x25 page. SURF will have the ability to send pages to Clients via row-by-row updates.

However, updating a complete 80-character row could be very inefficient, particularly if only one or two characters in that Field have changed.

SURF will support Partial Field Updates by the introduction of a control sequence notifier <CS> (Hex 9B). One or two numerical (0-9) characters will follow <CS>. These will define the offset within the row at which to apply the update (0 - 79) for the 80 character Field.

After the one or two numeric characters the control sequence is terminated with the character ' (Hex 60). The table below summarises this:-

Field	Length	Notes
<CS>	1	Hex 9B
Offset of update	1 or 2 0>n<79	ASCII numeric characters.
`	1	Hex 60 - specifies a partial update (Apostrophe normally on top left key of a QWERTY keyboard)
Data Update	1>n<80	Any ASCII string

Note that multiple partial updates could occur within 1 Field update. Also, the offset characters may be omitted if the partial update begins at offset 0.

Character/Space Compression

Fields 315 through 339 may also receive updates that contain repeated characters compressed by the use of a control sequence character. The same Control Sequence Notifier <CS> is used (Hex 9B) again followed by 1 or 2 numeric characters and then a character b (Hex 62).

The control sequence and repeat numeric FOLLOWS the character to be repeated. For example if a whole 80 character row was to be space filled:-

Field	Length	Notes
Character to be	1	Space repeated
<CS>	1	Hex 9B
Number of times	1 or 2 1>n<80	ASCII numeric characters.
b	1	Hex 62 - specifies a repeat string

Data Representation

Record Names/Record Stubs

SURF will employ the concept of a 5 character 'stub' as the first 5 characters of the Record Name.

The first 2 characters will identify the Market Group e.g. MM for Money Markets, CM for Capital Markets, GB for Government Bonds.

The next three characters will identify an Instrument Code e.g. IRS - Interest Rate Swap, UNB - U.S. Government Debt.

The rest of the Record Name will be dependant on the 5-character stub. In some cases it will be human readable e.g. MMDEPGBP03M - Money Market Sterling 3 Month Cash Deposit. In other cases the Record Name will simply be a unique reference.

In all cases the data required to parse/analyse the record will be contained within the Fields inside the record. For each 5 character Stub there will be a set list of Fields as defined by TPI (CI) and supplied in electronic format.

For example, a Spot Record MMSPTEURUSD (and all Spot records with a 5 character stub MMSPT) may have only Bid and Ask fields whereas a Government Bond Record e.g. GBUNB9128276T0 will have Bid Price, Ask Price, Mid Yield, Coupon, Maturity, Description etc.

Field Identification

As outlined above there will be a TPI supplied list of fields for each 5-character stub. In addition TPI will supply a standard field list which will list all fields used anywhere within SURF. Note that the SURF Master Field List will be different to the Reuters Marketfeed list.

In a similar way to Marketfeed, all fields are identified as a Price, Text or Integer with a maximum length supplied. SURF does not use enumerated fields. Reference data lists (e.g. Currencies) are documented in the SURF Datasets document.

Appendix A - Sample Stubs & Records

A.1 Sample Stubs

The table below lists some example 5 character Stub codes TPI anticipate using:-

STUB	Description	Record Name Example
MMSPT	Money Market Spot data	MMSPTEURUSD
MMDEP	Money Market Cash Deposits	MMDEPGBP3M
TMUNB	Gov Bonds Debt	TMUNB9127956T0
CMIRS	Capital Markets Interest Rate Swap	CMIRSUSD02YSA3L

A.2 Example Spot Record

The following lists an example of the Fields that could be anticipated in a Spot record:-

Field No	Field Name	Field Type	Max Length	Sample Data
22	Bid	Price	17	1.5095
25	Ask	Price	17	1.5105
5	Time of Update	Time(5)	5	17:32
17	Date of Update	Date(11)	11	23 Jun 2001
517	Primary Ccy	Alpha	3	GBP
518	Secondary Ccy	Alpha	3	USD
1	Display Name	Alpha	32	Spot GBP/USD
2	Market	Alpha	2	MM (Money Markets)
3	Instrument Type	Alpha	3	SPT (Spot)
4	Period1	Alpha	3	SPT (Spot)
6	Period 2	Alpha	3	blank

Please note that the above table should not be taken as definitive. The SURF datasets document will define the exact fields expected for any Stub.

A.3 Example Chain Record

The table below shows an example of three chains Records for the chain 'ALLSPOTS'.

		0#ALLSPOTS	1#ALLSPOTS	2#ALLSPOTS
FID No	FID Name	Contents	Contents	Contents
239	REFERENCE COUNT	14	14	4
800	LONGLINK1	MMSPTUSDADD	MMSPTEURUSD	MMSPTUSDPLN
801	LONGLINK2	MMSPTUSDAED	MMSPTGBPUSD	MMSPTUSDPTE
802	LONGLINK3	MMSPTAUDARS	MMSPTUSDHKD	MMSPTUSDRUB
803	LONGLINK4	MMSPTUSDAUD	MMSPTUSDHUF	MMSPTUSDSAR
804	LONGLINK5	MMSPTUSDBRL	MMSPTUSDINR	
805	LONGLINK6	MMSPTUSDCAD	MMSPTUSDJPY	
806	LONGLINK7	MMSPTUSDCDE	MMSPTUSDKRW	
807	LONGLINK8	MMSPTUSDCHF	MMSPTUSDKWD	
808	LONGLINK9	MMSPTUSDCLP	MMSPTUSDMXN	
809	LONGLINK10	MMSPTUSDCNY	MMSPTUSDMYR	
810	LONGLINK11	MMSPTUSDCOP	MMSPTUSDNOK	
811	LONGLINK12	MMSPTUSDCZK	MMSPTUSDNTD	
812	LONGLINK13	MMSPTUSDDKK	MMSPTUSDPEN	
813	LONGLINK14	MMSPTUSDECS	MMSPTUSDPHP	
814	LONGPREVLR		0#ALLSPOTS	1#ALLSPOTS
815	LONGNEXTLR	1#ALLSPOTS	2#ALLSPOTS	

Note that the data above is purely an example and should not be considered definitive.

Appendix B: Data Codes

B.1 SURF Master Field List

This file lists all Fields that can occur in SURF and is supplied in computer readable format. An example is included here for completeness. The data contained herein should NOT be considered definitive or even correct. Refer to the separate document (file) call SURF Master Field List.

```
# SURF Master Field List
# Version 1.00
# Generated 24-Sep-2001 09:37
FieldNum,Format,Size,Default use Description,* 1,Text,
32,Display Name,*
5,Time, 5,Time of Last Update,*
22,Price, 17,Bid Price or Yield,*
23,Price, 17,Bid Price in 32nds format,*
25,Price, 17,Ask Price or Yield,*
26,Price, 17,Ask Price in 32nds format,*
78,Text, 12,Primary Isin or Cusip,*
*
```

B.2 SURF Stub and Field List

This file lists all Stubs that can occur in SURF and the Fields that can be supplied for that Stub. The File is supplied in computer readable format. Note that depending on the commercial agreement between TPI and the customer some Fields may not be enabled for a particular customer. An example is included here for completeness. The data contained herein should NOT be considered definitive or even correct. Refer to the separate document (file) call SURF Stub Field List.

```
# SURF Stub Field List
# Version 1.00
# Generated 24-Sep-2001 09:40
MMSPT, Money Market Spot, 1,5,22,25,*
MMDEP, Money Market Cash Deposits, 1,5,22,25,*
GBUNB, Government Debt, 1,5,22,23,25,26,78,*
ASTSL, US Asset Swap Line, 1,5,22,23,25,27,78,*
```

Appendix C - Reference Data

These lists are examples included for clarity and completeness. They are subsets of the full tables and should not be considered correct or complete. Refer to the document entitled 'SURF Datasets' for full lists.

C.1 Currency

ADD	Australian Dollar (Domestic)
AED	UAE Dirham
ARS	Argentine Pesos
AUD	Australian Dollar
BRL	Brazilian Real
CAD	Canadian Dollar
CDE	Canadian Dollar (Euro FX)
CHF	Swiss Franc
CLP	Chilean Peso
CNY	Chinese Renminbi
COP	Columbian Peso
CZK	Czech Koruna
DKK	Danish Krone
ECS	Ecuadorian Sucre
EUR	Euro
GBD	British Pound Domestic
GBP	British Pound
GRD	Greek Drachma
HKD	Hong Kong Dollar
HUF	Hungarian Forint
INR	Indian Rupee
JPY	Japanese Yen
KRW	Korean Won
KWD	Kuwaiti Dinar
MXN	Mexican Peso
MYR	Malaysian Ringgitt
NOK	Norwegian Krone
NTD	New Taiwan Dollar
NZD	New Zealand Dollar
PEN	Peruvian Sol
PHP	Philippine Peso
PLN	Polish Zlotty
PTE	Portuguese Escudo
RUB	Russian Rouble
SAR	Saudi Arabian Rial
SEK	Swedish Krona
SDD	Singapore Dollar (Domestic)
SGD	Singapore Dollar
THB	Thailand Baht
THD	Thailand Baht (Domestic)
TWD	Taiwanese Dollar
USD	United States Dollar
USJ	United States Dollar (Japanese quotation)
VEB	Venezuelan Bolivar
ZAR	South African Rand

C.2 Period

01M	1 Month
01W	1 Week
01Y	1 Year
02M	2 Month
BRK	Broken Date (i.e. a non standard period)
IM1	1st IMM Contract Date

C.3 Country

Note that SURF supports both 2 character and 3 character country codes depending on the market.

AUS	AU	Australia
CAN	CA	Canada
DEU	DE	Germany
FRA	FR	France
GBR	GB	United Kingdom
USA	US	United States