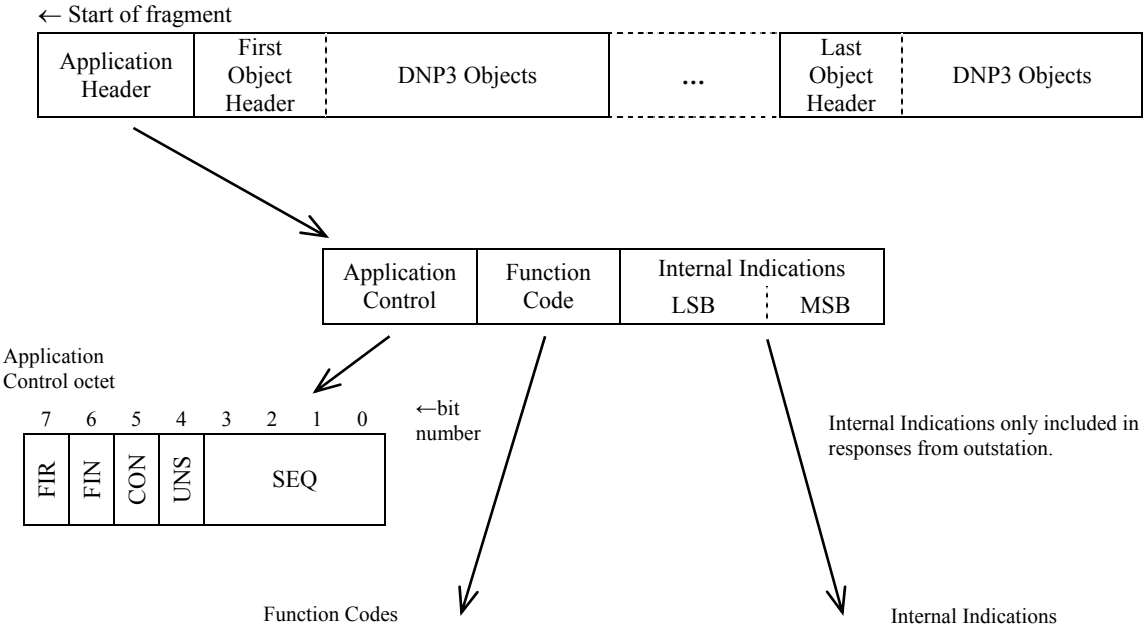
DNP3 QUICK REFERENCE

Application Layer



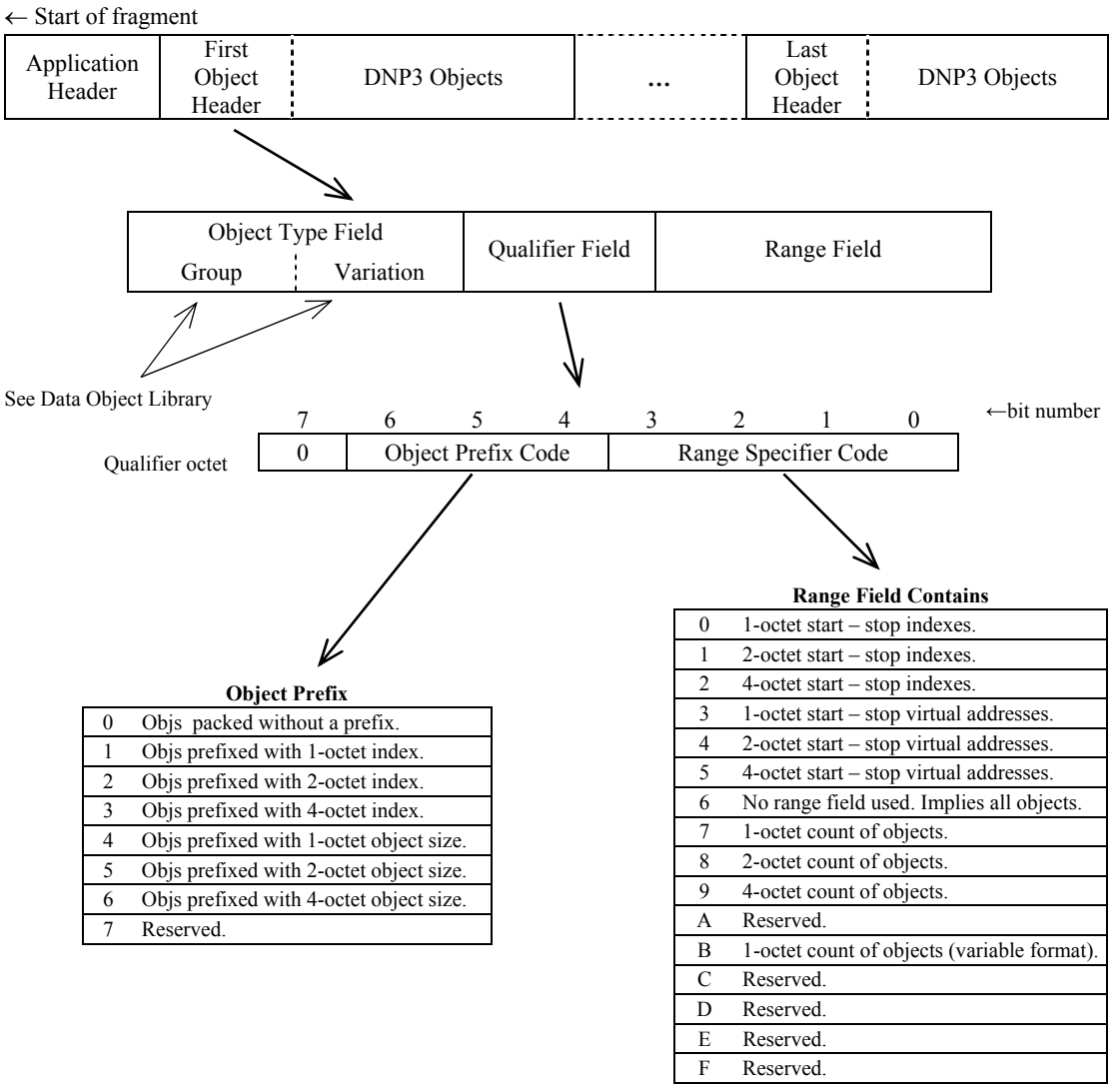
Function Codes

Requests (Hex)			
0	Confirm	10	Initialize application
1	Read	11	Start application
2	Write	12	Stop application
3	Select	13	Save configuration
4	Operate	14	Enable unsolicited
5	Dir operate	15	Disable unsolicited
6	Dir operate – No resp	16	Assign class
7	Freeze	17	Delay measurement
8	Freeze – No resp	18	Record current time
9	Freeze clear	19	Open file
A	Freeze clear – No resp	1A	Close file
B	Freeze at time	1B	Delete file
C	Freeze at time – No resp	1C	Get file information
D	Cold restart	1D	Authenticate file
E	Warm restart	1E	Abort file
F	Initialize data		
Responses (Hex)			
81	Response		
82	Unsolicited response		

Internal Indications

LSB	
IIN1.0	All stations
IIN1.1	Class 1 events
IIN1.2	Class 2 events
IIN1.3	Class 3 events
IIN1.4	Need time
IIN1.5	Local control
IIN1.6	Device trouble
IIN1.7	Device restart
MSB	
IIN2.0	Function code not supported
IIN2.1	Object unknown
IIN2.2	Parameter error
IIN2.3	Event buffer overflow
IIN2.4	Already executing
IIN2.5	Configuration corrupt
IIN2.6	Reserved 1
IIN2.7	Reserved 2

Application Layer



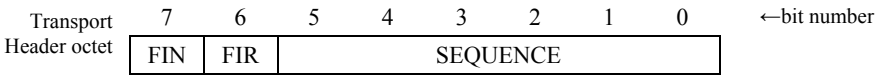
Object Prefix

0	Objs packed without a prefix.
1	Objs prefixed with 1-octet index.
2	Objs prefixed with 2-octet index.
3	Objs prefixed with 4-octet index.
4	Objs prefixed with 1-octet object size.
5	Objs prefixed with 2-octet object size.
6	Objs prefixed with 4-octet object size.
7	Reserved.

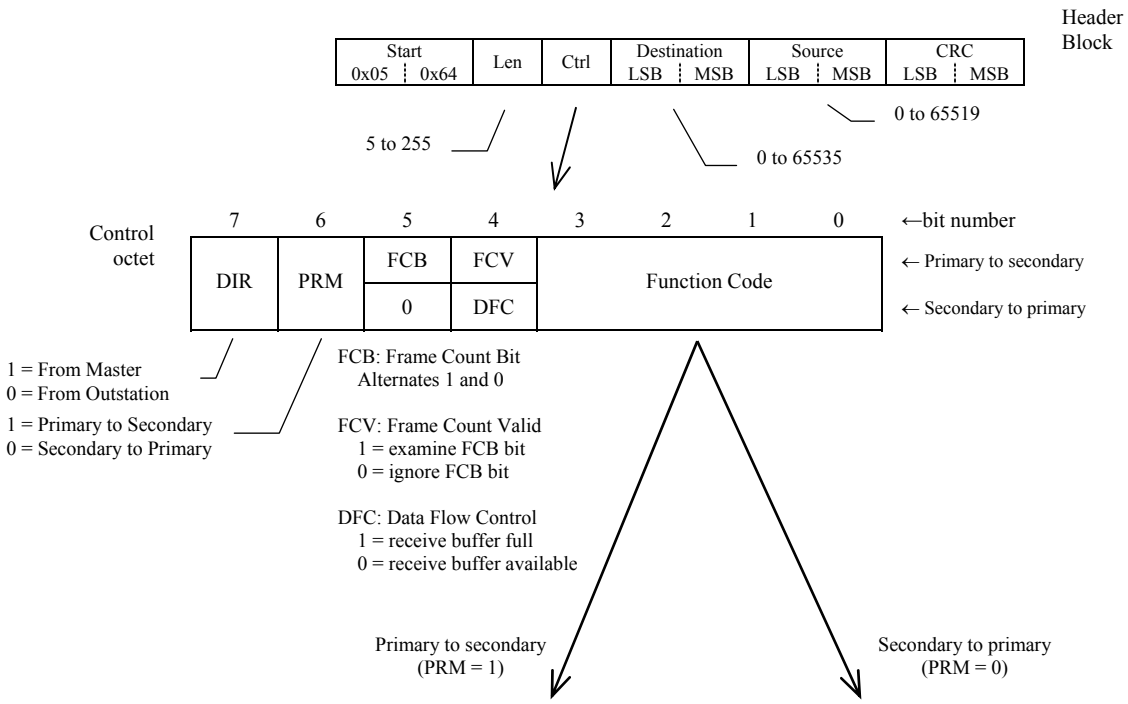
Range Field Contains

0	1-octet start – stop indexes.
1	2-octet start – stop indexes.
2	4-octet start – stop indexes.
3	1-octet start – stop virtual addresses.
4	2-octet start – stop virtual addresses.
5	4-octet start – stop virtual addresses.
6	No range field used. Implies all objects.
7	1-octet count of objects.
8	2-octet count of objects.
9	4-octet count of objects.
A	Reserved.
B	1-octet count of objects (variable format).
C	Reserved.
D	Reserved.
E	Reserved.
F	Reserved.

Transport Function



Data Link Layer



Primary Function Code	Function Code Name	FCV Bit
0	RESET_LINK_STATES	0
1	–	–
2	TEST_LINK_STATES	1
3	CONFIRMED_USER_DATA	1
4	UNCONFIRMED_USER_DATA	0
5	–	–
6	–	–
7	–	–
8	–	–
9	REQUEST_LINK_STATUS	0
A	–	–
B	–	–
C	–	–
D	–	–
E	–	–
F	–	–

Secondary Function Code	Function Code Name
0	ACK
1	NACK
2	–
3	–
4	–
5	–
6	–
7	–
8	–
9	–
A	–
B	LINK_STATUS
C	–
D	–
E	–
F	NOT_SUPPORTED

Valid Data Link Layer Control Codes

Outstation to Master	Master to Outstation	Function Code Name	Type	Comment
00	**80**	**ACK**	Sec-to-Pri	
01	**81**	**NACK**		Link reset required
0B	8B	LINK_STATUS		
0F	8F	NOT_SUPPORTED		
10	90	ACK		Receive buffers full
11	91	NACK		Receive buffers full
1B	9B	LINK_STATUS		Receive buffers full
1F	9F	NOT_SUPPORTED		Receive buffers full
40	**C0**	**RESET_LINK_STATES**	Pri-to-Sec	FCB = 0 (secondary ignores FCB)
44	**C4**	**UNCONFIRMED_USER_DATA**		FCB = 0 (secondary ignores FCB)
49	C9	REQUEST_LINK_STATUS		FCB = 0 (secondary ignores FCB)
52	D2	TEST_LINK_STATES		FCB = 0
53	**D3**	**CONFIRMED_USER_DATA**		FCB = 0
60	E0	RESET_LINK_STATES		FCB = 1 (secondary ignores FCB)
64	E4	UNCONFIRMED_USER_DATA		FCB = 1 (secondary ignores FCB)
69	E9	REQUEST_LINK_STATUS		FCB = 1 (secondary ignores FCB)
72	F2	TEST_LINK_STATES		FCB = 1
73	**F3**	**CONFIRMED_USER_DATA**		FCB = 1

Most commonly used are shown in **bold** face.

DNP3 Exchange Samples

Reset Link Example	
--► 05 64 05 C0 01 00 00 04 E9 21	Reset link states
◄-- 05 64 05 00 00 04 01 00 19 A6	Ack

Integrity Poll Example	
--► 05 64 14 F3 01 00 00 04 0A 3B C0 C3 01 3C 02 06 3C 03 06 3C 04 06 3C 01 06 9A 12	Request class 1, 2, 3 and 0 data
◄-- 05 64 05 00 00 04 01 00 19 A6	Link layer confirm
◄-- 05 64 05 40 00 04 01 00 A3 96	Reset link states
--► 05 64 05 80 01 00 00 04 53 11	Ack
◄-- 05 64 53 73 00 04 01 00 03 FC C1 E3 81 96 00 02 01 28 01 00 00 00 01 02 01 28 05 24 01 00 01 00 01 02 01 28 01 00 02 00 01 02 01 28 B4 77 01 00 03 00 01 20 02 28 01 00 00 00 01 00 00 20 A5 25 02 28 01 00 01 00 01 00 00 01 01 01 00 00 03 00 2F AC 00 1E 02 01 00 00 01 00 01 00 00 01 00 00 16 ED	Response. IIN = device restart, need time, class 1 & 2 events. 4 binary input events, 2 analog input events, 4 binary inputs and 2 analog inputs.
--► 05 64 05 80 01 00 00 04 53 11	Link layer confirm
--► 05 64 08 C4 01 00 00 04 A4 CF C1 C3 00 20 3F	Application layer confirm

Reset Restart IIN Bit	
--► 05 64 0E C4 01 00 00 04 7D A4 C0 C4 02 50 01 00 07 07 00 64 11	Request write IIN1.7 = 0
◄-- 05 64 0A 44 00 04 01 00 59 5E C2 C4 81 10 00 93 AD	Null response

Set Time and Date	
--► 05 64 12 C4 01 00 00 04 0E 0B C0 C5 02 32 01 07 01 F8 B8 6C AA F0 00 98 98	Request write time and date
◄-- 05 64 0A 44 00 04 01 00 59 5E C3 C5 81 00 00 55 93	Null response

Key: --► Master station transmissions (Address 1024 decimal).
◄-- Outstation transmissions (Address 1).