

原始数据

	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
A	1	0	0	1	1	0	0	1	0	0	0	1	0	0	1	1
B	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0
C	1	0	1	0	1	0	1	1	0	0	0	0	0	0	1	1
D	0	0	0	0	1	1	1	0	0	0	0	0	1	0	1	1
E	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
F	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
G	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1
H	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
I	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
J	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	1	0	1	0	1	0	0	0	1	0	0	0	1	0	1
L	0	1	0	1	0	0	1	1	0	1	0	1	0	1	0	0
M	0	1	0	0	1	0	0	1	0	1	0	0	1	1	1	0
N	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0

J表示：校验和取零。

N表示：不足 16 位自动填充零。

二进制反码运算求和： $0+0=1$ ， $0+1=1$ ， $1+1=0$ 且进位 1

使用二进制反码运算求和的地方：

IP 数据报的首部校验和，P127 P129

ICMP 报文的校验和，P146

OSPF 分组的校验和，P159

UDP 校验和，P195

TCP 校验和，P202

在 TCP/IP 中，除了 FCS 使用 CRC 算法外，基本上所有的校验都是通过二进制反码运算求和进行的。

发送端进行二进制反码求和

	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
A	1	0	0	1	1	0	0	1	0	0	0	1	0	0	1	1
B	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0
=	1	0	1	0	0	0	0	1	0	1	1	1	1	0	1	1
C	1	0	1	0	1	0	1	1	0	0	0	0	0	0	1	1
=	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	0
进																1
=	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	1
D	0	0	0	0	1	1	1	0	0	0	0	0	1	0	1	1
=	0	1	0	1	1	0	1	0	1	0	0	0	1	0	1	0
E	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
=	0	1	0	1	1	0	1	0	1	0	0	1	1	0	1	1
F	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
=	0	1	0	1	1	0	1	0	1	0	1	0	1	0	1	0
G	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1
=	0	1	0	1	1	1	1	0	1	1	1	0	1	0	0	1
H	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
=	0	1	0	1	1	1	1	0	1	1	1	1	0	1	1	0
I	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1

=	0	1	0	1	1	1	1	1	0	0	0	0	0	1	0	1
J	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	0	1	0	1	1	1	1	1	0	0	0	0	0	1	0	1
K	0	1	0	1	0	1	0	0	0	1	0	0	0	1	0	1
=	1	0	1	1	0	0	1	1	0	1	0	0	1	0	1	0
L	0	1	0	1	0	0	1	1	0	1	0	1	0	1	0	0
=	0	0	0	0	0	1	1	0	1	0	0	1	1	1	1	0
进																1
=	0	0	0	0	0	1	1	0	1	0	0	1	1	1	1	1
M	0	1	0	0	1	0	0	1	0	1	0	0	1	1	1	0
=	0	1	0	0	1	1	1	1	1	1	1	0	1	1	0	1
N	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0
=	1	0	0	1	0	1	1	0	1	1	1	0	1	1	0	1
补	0	1	1	0	1	0	0	1	0	0	0	1	0	0	1	0

接收端进行验证

	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
A	1	0	0	1	1	0	0	1	0	0	0	1	0	0	1	1
B	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0
=	1	0	1	0	0	0	0	1	0	1	1	1	1	0	1	1
C	1	0	1	0	1	0	1	1	0	0	0	0	0	0	1	1
=	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	0
进																1
=	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	1
D	0	0	0	0	1	1	1	0	0	0	0	0	1	0	1	1
=	0	1	0	1	1	0	1	0	1	0	0	0	1	0	1	0
E	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
=	0	1	0	1	1	0	1	0	1	0	0	1	1	0	1	1
F	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
=	0	1	0	1	1	0	1	0	1	0	1	0	1	0	1	0
G	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1
=	0	1	0	1	1	1	1	0	1	1	1	0	1	0	0	1
H	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
=	0	1	0	1	1	1	1	0	1	1	1	1	0	1	1	0
I	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1

