# 指点江山



## netlink与rtnetlink（二）

**博客分类：**
- Linux网络开发

转至：http://blogold.chinaunix.net/u/15993/showart_90109.html

rtnetlink就是一组操作rtnetlink消息的宏。
在netlink中，初始化一个netlink_route套接字时，最后一个字段使用NETLINK_ROUTE时就是rtnetlink_socket。

```
#include <asm/types.h>
    #include <linux/netlink.h>
    #include <linux/rtnetlink.h>
    #include <sys/socket.h>
    rtnetlink_socket = socket(PF_NETLINK, int socket_type, NETLINK_ROUTE);
```

这组宏包括：

```
int RTA_OK(struct rtattr *rta, int rtabuflen);
    void *RTA_DATA(struct rtattr *rta);
    unsigned int RTA_PAYLOAD(struct rtattr *rta);
    struct rtattr *RTA_NEXT(struct rtattr *rta, unsigned int rtabuflen);
    unsigned int RTA_LENGTH(unsigned int length);
    unsigned int RTA_SPACE(unsigned int length);
```

使用这一组宏可以对路由表进行读写和修改。不仅对路由表，还有很多网络参数都可以通过rtnetlink来修改。
路由属性：
一些rtnetlink消息在初始化头后面有附加的属性：

```
struct rtattr
    {
  unsigned short rta_len;     /* Length of option */
  unsigned short rta_type;    /* Type of option */
  /* Data follows */
    };
```

除了标准的netlink消息之外，rtnetlink由这些消息类型组成。
RTM_NEWLINK, RTM_DELLINK, RTM_GETLINK
创建或者删除一个特定的网络接口，或者从一个特定的网络接口上获得信息。这些消息含有

一个ifinfomsg类型的结构，紧跟在后面的是一系列的rtattr结构。

```
struct ifinfomsg
{
 unsigned char  ifi_family;  /* AF_UNSPEC */
 unsigned char  __ifi_pad;   /* unused */
 unsigned short ifi_type;    /* Device type */
 int   ifi_index;   /* Interface index   */
 unsigned int  ifi_flags;   /* Device flags  */
 unsigned int  ifi_change;  /* change mask */
}
```

其中ifi_change是为将来预留的，总是被设为0xFFFFFFFF

| rta_type | value type | description |
|---|---|---|
| IFLA_UNSPEC | - | unspecified. |
| IFLA_ADDRESS | hardware address | interface L2 address |
| IFLA_BROADCAST | hardware address | L2 broadcast address. |
| IFLA_IFNAME | asciiz string | Device name. |
| IFLA_MTU | unsigned int | MTU of the device. |
| IFLA_LINK | int | Link type. |
| IFLA_QDISC | asciiz string | Queueing discipline. |
| IFLA_STATS | struct net_device_stats | Interface Statistics. |

RTM_NEWADDR, RTM_DELADDR, RTM_GETADDR

添加,删除或者接收一个和接口相关的IP地址的信息。在linux2.2中，一个网口是可以有多个IP地址信息的。这些消息含有一个ifaddrmsg类型的结构，紧跟在后面的是一系列的rtattr结构。

```
struct ifaddrmsg
    {
  unsigned char  ifa_family;  /* Address type */
  unsigned char  ifa_prefixlen;/* Prefixlength of the address */
  unsigned char  ifa_flags;   /* Address flags */
  unsigned char  ifa_scope;   /* Address scope */
  int   ifa_index;   /* Interface index   */
    };
```

| rta_type | value type | description |
|---|---|---|
| IFA_UNSPEC | - | unspecified. |
| IFA_ADDRESS | raw protocol address | interface address |
| IFA_LOCAL | raw protocol address | local address |
| IFA_LABEL | asciiz string | name of the interface |
| IFA_BROADCAST | raw protocol address | broadcast address. |
| IFA_ANYCAST | raw protocol address | anycast address |
| IFA_CACHEINFO | struct ifa_cacheinfo | Address information. |

RTM_NEWROUTE, RTM_DELROUTE, RTM_GETROUTE

创建,删除一个网络路由或者从一个网络路由上获得信息。这些消息包含了一个rtmsg结构，紧跟着的是一系列的rtattr结构，这是可选的。

```
struct rtmsg
    {
  unsigned char  rtm_family;  /* Address family of route */
  unsigned char  rtm_dst_len; /* Length of source */
  unsigned char  rtm_src_len; /* Length of destination */
  unsigned char  rtm_tos;     /* TOS filter */
  unsigned char  rtm_table;   /* Routing table id */
  unsigned char  rtm_protocol;/* Routing protocol; see below */
  unsigned char  rtm_scope;   /* See below */
```

unsigned char rtm_type; /* See below */
unsigned int rtm_flags;
};
rtm_type Route type
---
RTN_UNSPEC unknown route
RTN_UNICAST a gateway or direct route
RTN_LOCAL a local interface route
RTN_BROADCAST a local broadcast route (sent as a broadcast)
RTN_ANYCAST a local broadcast route (sent as a unicast)
RTN_MULTICAST a multicast route
RTN_BLACKHOLE a packet dropping route
RTN_UNREACHABLE an unreachable destination
RTN_PROHIBIT a packet rejection route
RTN_THROW continue routing lookup in another table
RTN_NAT a network address translation rule
RTN_XRESOLVE refer to an external resolver (not implemented)
rtm_protocol Route origin.
---
RTPROT_UNSPEC unknown
RTPROT_REDIRECT by an ICMP redirect (currently unused)
RTPROT_KERNEL by the kernel
RTPROT_BOOT during boot
RTPROT_STATIC by the administrator
比RTPROT_STATIC大的值就不会再被kernel解释了，他们就只是用于用户信息了。
rtm_scope为到目标的距离
RT_SCOPE_UNIVERSE global route
RT_SCOPE_SITE interior route in the local autonomous system
RT_SCOPE_LINK route on this link
RT_SCOPE_HOST route on the local host
RT_SCOPE_NOWHERE destination doesn't exist
RT_SCOPE_UNIVERSE到RT_SCOPE_SITE之间的值是对用户可得的。
The rtm_flags有以下一些含义：
RTM_F_NOTIFY if the route changes, notify the user via rtnetlink
RTM_F_CLONED route is cloned from another route
RTM_F_EQUALIZE a multicast equalizer (not yet implemented)
rtm_table表明了路由表
RT_TABLE_UNSPEC an unspecified routing table
RT_TABLE_DEFAULT the default table
RT_TABLE_MAIN the main table
RT_TABLE_LOCAL the local table
用户可以分配RT_TABLE_UNSPEC和RT_TABLE_DEFAULT之间任意的值。
属性
rta_type value type description
---
RTA_UNSPEC - ignored.
RTA_DST protocol address Route destination address.
RTA_SRC protocol address Route source address.

RTA_IIF int Input interface index.
RTA_OIF int Output interface index.
RTA_GATEWAY protocol address The gateway of the route
RTA_PRIORITY int Priority of route.
RTA_PREFSRC
RTA_METRICS int Route metric
RTA_MULTIPATH
RTA_PROTOINFO
RTA_FLOW
RTA_CACHEINFO

RTM_NEWNEIGH, RTM_DELNEIGH, RTM_GETNEIGH
RTM_NEWQDISC, RTM_DELQDISC, RTM_GETQDISC
RTM_NEWTCLASS, RTM_DELTCLASS, RTM_GETTCLASS
RTM_NEWTFILTER, RTM_DELTFILTER, RTM_GETTFILTER
这四组宏我就不一一介绍了，大家可以man一下。



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