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Subject: [PATCH 12/12] network namespace: L2 and L3 intro  
Posted by [Mishin Dmitry](#) on Wed, 06 Dec 2006 22:30:28 GMT  
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Introduce two kind of network namespaces - level 2 and level 3. First one is namespace with full set of networking objects, while second one - socket-level with restricted set.

Signed-off-by: Dmitry Mishin <dim@openvz.org>

```
---
drivers/net/veth.c      | 2 -
include/linux/net_namespace.h | 5 +++-
include/linux/nsproxy.h  | 5 +++-
include/linux/sched.h   | 2 +
kernel/fork.c           | 3 +-
kernel/nsproxy.c        | 5 +++-
net/core/net_namespace.c | 43 ++++++-----
7 files changed, 45 insertions(+), 20 deletions(-)
```

```
--- linux-2.6.19-rc6-mm2.orig/drivers/net/veth.c
+++ linux-2.6.19-rc6-mm2/drivers/net/veth.c
@@ -327,7 +327,7 @@ static ssize_t veth_debug_write(struct f
     id = simple_strtoul(s + 1, &s, 0);
     err = sys_bind_ns(id, NS_ALL);
 } else
- err = sys_unshare_ns(NS_NET);
+ err = sys_unshare_ns(NS_NET2);
   if (err)
     goto out;
   /* return to parent namespace */
--- linux-2.6.19-rc6-mm2.orig/include/linux/net_namespace.h
+++ linux-2.6.19-rc6-mm2/include/linux/net_namespace.h
@@ -27,6 +27,9 @@ struct net_namespace {
     struct net_namespace *parent;
     struct list_head child_list, sibling_list;
     unsigned int id;
+#define NET_NS_LEVEL2 1
+#define NET_NS_LEVEL3 2
+ unsigned int level;
};

extern struct net_namespace init_net_ns;
@@ -85,7 +88,7 @@ static inline void get_net_ns(struct net
static inline int unshare_net_ns(unsigned long unshare_flags,
    struct net_namespace **new_net)
{
- if (unshare_flags & NS_NET)
```

```

+ if (!(flags & (NS_NET2 | NS_NET3)))
    return -EINVAL;

    return 0;
--- linux-2.6.19-rc6-mm2.orig/include/linux/nsproxy.h
+++ linux-2.6.19-rc6-mm2/include/linux/nsproxy.h
@@ -20,9 +20,10 @@ struct user_namespace;
#define NS_UTS 0x00000002
#define NS_IPC 0x00000004
#define NS_PID 0x00000008
-#define NS_NET 0x00000010
+#define NS_NET2 0x00000010
#define NS_USER 0x00000020
-#define NS_ALL (NS_MNT|NS_UTS|NS_IPC|NS_PID|NS_NET|NS_USER)
+#define NS_NET3 0x00000040
+#define NS_ALL (NS_MNT|NS_UTS|NS_IPC|NS_PID|NS_NET2|NS_USER)

/*
 * A structure to contain pointers to all per-process
--- linux-2.6.19-rc6-mm2.orig/include/linux/sched.h
+++ linux-2.6.19-rc6-mm2/include/linux/sched.h
@@ -26,6 +26,8 @@
#define CLONE_STOPPED 0x02000000 /* Start in stopped state */
#define CLONE_NEWUTS 0x04000000 /* New utsname group? */
#define CLONE_NEWIPC 0x08000000 /* New ipcns */
+#define CLONE_NEWNET2 0x10000000 /* New level 2 network namespace */
+#define CLONE_NEWNET3 0x20000000 /* New level 3 network namespace */

/*
 * Scheduling policies
--- linux-2.6.19-rc6-mm2.orig/kernel/fork.c
+++ linux-2.6.19-rc6-mm2/kernel/fork.c
@@ -1627,7 +1627,8 @@ asmlinkage long sys_unshare(unsigned lon
    err = -EINVAL;
    if (unshare_flags & ~(CLONE_THREAD|CLONE_FS|CLONE_NEWNS|CLONE_SIGHAND|
        CLONE_VM|CLONE_FILES|CLONE_SYSVSEM|
-    CLONE_NEWUTS|CLONE_NEWIPC))
+    CLONE_NEWUTS|CLONE_NEWIPC|CLONE_NEWNET2|
+    CLONE_NEWNET3))
        goto bad_unshare_out;

    if ((err = unshare_thread(unshare_flags)))
--- linux-2.6.19-rc6-mm2.orig/kernel/nsproxy.c
+++ linux-2.6.19-rc6-mm2/kernel/nsproxy.c
@@ -120,7 +120,8 @@ int copy_namespaces(int flags, struct ta

    get_nsproxy(old_ns);

```

```

- if (!(flags & (CLONE_NEWNS | CLONE_NEWUTS | CLONE_NEWIPC)))
+ if (!(flags & (CLONE_NEWNS | CLONE_NEWUTS | CLONE_NEWIPC |
+ CLONE_NEWNET2 | CLONE_NEWNET3)))
    return 0;

    new_ns = clone_namespaces(old_ns);
@@ -329,7 +330,7 @@ static int switch_ns(int id, unsigned lo
    put_pid_ns(new_ns->pid_ns);
    new_ns->pid_ns = ns->pid_ns;
}
- if (flags & NS_NET) {
+ if (flags & (NS_NET2 | NS_NET3)) {
    get_net_ns(ns->net_ns);
    put_net_ns(new_ns->net_ns);
    new_ns->net_ns = ns->net_ns;
--- linux-2.6.19-rc6-mm2.orig/net/core/net_namespace.c
+++ linux-2.6.19-rc6-mm2/net/core/net_namespace.c
@@ -32,14 +32,20 @@ struct net_namespace init_net_ns = {

/*
 * Clone a new ns copying an original net ns, setting refcount to 1
+ * @level: level of namespace to create
 * @old_ns: namespace to clone
- * Return NULL on error (failure to kcalloc), new ns otherwise
+ * Return ERR_PTR on error, new ns otherwise
 */
-static struct net_namespace *clone_net_ns(struct net_namespace *old_ns)
+static struct net_namespace *clone_net_ns(unsigned int level,
+ struct net_namespace *old_ns)
{
    struct net_namespace *ns, *orig_ns;
    static unsigned int id = 1;

+ /* level 3 namespaces are incomplete in order to have childs */
+ if (current_net_ns->level == NET_NS_LEVEL3)
+ return ERR_PTR(-EPERM);
+
    ns = kcalloc(sizeof(struct net_namespace), GFP_KERNEL);
    if (!ns)
        return NULL;
@@ -59,20 +65,25 @@ static struct net_namespace *clone_net_n
    spin_unlock_irq(&net_ns_list_lock);

    orig_ns = push_net_ns(ns);
+ if (level == NET_NS_LEVEL2) {
+ #ifdef CONFIG_IP_MULTIPLE_TABLES
- INIT_LIST_HEAD(&ns->fib_rules_ops_list);
+ INIT_LIST_HEAD(&ns->fib_rules_ops_list);

```

```

#endif
- if (ip_fib_struct_init())
- goto out_fib4;
+ if (ip_fib_struct_init())
+ goto out_fib4;
+ }
+ ns->level = level;
  if (loopback_init())
    goto out_loopback;
  put_net_ns(orig_ns);
- printk(KERN_DEBUG "NET_NS: created new netcontext %p (%u) for %s "
- "(pid=%d)\n", ns, ns->id, current->comm, current->tgid);
+ printk(KERN_DEBUG "NET_NS: created new netcontext %p (%u), level %u, "
+ "for %s (pid=%d)\n", ns, ns->id, (ns->level == NET_NS_LEVEL2) ?
+ 2 : 3, current->comm, current->tgid);
  return ns;

out_loopback:
- ip_fib_struct_cleanup();
+ if (level == NET_NS_LEVEL2)
+ ip_fib_struct_cleanup();
out_fib4:
  put_net_ns(orig_ns);
  BUG_ON(atomic_read(&ns->kref.refcount) != 1);
@@ -86,17 +97,22 @@ out_fib4:
int unshare_net_ns(unsigned long unshare_flags,
    struct net_namespace **new_net)
{
- if (unshare_flags & NS_NET) {
+ unsigned int level;
+
+ if (unshare_flags & (NS_NET2 | NS_NET3)) {
  if (!capable(CAP_SYS_ADMIN))
    return -EPERM;

- *new_net = clone_net_ns(current->nsproxy->net_ns);
- if (!*new_net)
- return -ENOMEM;
+ level = (unshare_flags & NS_NET2) ? NET_NS_LEVEL2 :
+ NET_NS_LEVEL3;
+ *new_net = clone_net_ns(level, current->nsproxy->net_ns);
+ if (IS_ERR(*new_net))
+ return PTR_ERR(*new_net);
  }

  return 0;
}
+EXPORT_SYMBOL(unshare_net_ns);

```

```

int copy_net_ns(int flags, struct task_struct *tsk)
{
@@ -157,7 +173,8 @@ void free_net_ns(struct kref *kref)
    ns, atomic_read(&ns->kref.refcount));
    return;
}
- ip_fib_struct_cleanup();
+ if (ns->level == NET_NS_LEVEL2)
+ ip_fib_struct_cleanup();
    printk(KERN_DEBUG "NET_NS: netcontext %p (%u) destroyed\n",
        ns, ns->id);
    kfree(ns);

```

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Containers@lists.osdl.org  
<https://lists.osdl.org/mailman/listinfo/containers>

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Subject: Re: [PATCH 12/12] network namespace: L2 and L3 intro  
Posted by [Cedric Le Goater](#) on Thu, 07 Dec 2006 09:34:24 GMT  
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---

I have issues with the hunks below. they don't apply :(

Can I have an updated version ? and I'll release the full patchset ASAP.

Thanks,

C.

```

> --- linux-2.6.19-rc6-mm2.orig/net/core/net_namespace.c
> +++ linux-2.6.19-rc6-mm2/net/core/net_namespace.c
> @@ -32,14 +32,20 @@ struct net_namespace init_net_ns = {
>
> /*
> * Clone a new ns copying an original net ns, setting refcount to 1
> + * @level: level of namespace to create
> * @old_ns: namespace to clone
> - * Return NULL on error (failure to kmalloc), new ns otherwise
> + * Return ERR_PTR on error, new ns otherwise
> */
> -static struct net_namespace *clone_net_ns(struct net_namespace *old_ns)
> +static struct net_namespace *clone_net_ns(unsigned int level,
> + struct net_namespace *old_ns)
> {
> struct net_namespace *ns, *orig_ns;
> static unsigned int id = 1;

```

```

>
> + /* level 3 namespaces are incomplete in order to have childs */
> + if (current_net_ns->level == NET_NS_LEVEL3)
> + return ERR_PTR(-EPERM);
> +
> ns = kmalloc(sizeof(struct net_namespace), GFP_KERNEL);
> if (!ns)
> return NULL;
> @@ -59,20 +65,25 @@ static struct net_namespace *clone_net_n
> spin_unlock_irq(&net_ns_list_lock);
>
> orig_ns = push_net_ns(ns);
> + if (level == NET_NS_LEVEL2) {
> #ifdef CONFIG_IP_MULTIPLE_TABLES
> - INIT_LIST_HEAD(&ns->fib_rules_ops_list);
> + INIT_LIST_HEAD(&ns->fib_rules_ops_list);
> #endif
> - if (ip_fib_struct_init())
> - goto out_fib4;
> + if (ip_fib_struct_init())
> + goto out_fib4;
> + }
> + ns->level = level;
> if (loopback_init())
> goto out_loopback;
> put_net_ns(orig_ns);
> - printk(KERN_DEBUG "NET_NS: created new netcontext %p (%u) for %s "
> - "(pid=%d)\n", ns, ns->id, current->comm, current->tgid);
> + printk(KERN_DEBUG "NET_NS: created new netcontext %p (%u), level %u, "
> + "for %s (pid=%d)\n", ns, ns->id, (ns->level == NET_NS_LEVEL2) ?
> + 2 : 3, current->comm, current->tgid);
> return ns;
>
> out_loopback:
> - ip_fib_struct_cleanup();
> + if (level == NET_NS_LEVEL2)
> + ip_fib_struct_cleanup();
> out_fib4:
> put_net_ns(orig_ns);
> BUG_ON(atomic_read(&ns->kref.refcount) != 1);
> @@ -86,17 +97,22 @@ out_fib4:
> int unshare_net_ns(unsigned long unshare_flags,
> struct net_namespace **new_net)
> {
> - if (unshare_flags & NS_NET) {
> + unsigned int level;
> +
> + if (unshare_flags & (NS_NET2 | NS_NET3)) {

```

```
> if (!capable(CAP_SYS_ADMIN))
> return -EPERM;
>
> - *new_net = clone_net_ns(current->nsproxy->net_ns);
> - if (!*new_net)
> - return -ENOMEM;
> + level = (unshare_flags & NS_NET2) ? NET_NS_LEVEL2 :
> +     NET_NS_LEVEL3;
> + *new_net = clone_net_ns(level, current->nsproxy->net_ns);
> + if (IS_ERR(*new_net))
> + return PTR_ERR(*new_net);
> }
>
> return 0;
> }
> +EXPORT_SYMBOL(unshare_net_ns);
>
> int copy_net_ns(int flags, struct task_struct *tsk)
> {
> @@ -157,7 +173,8 @@ void free_net_ns(struct kref *kref)
> ns, atomic_read(&ns->kref.refcount));
> return;
> }
> - ip_fib_struct_cleanup();
> + if (ns->level == NET_NS_LEVEL2)
> + ip_fib_struct_cleanup();
> printk(KERN_DEBUG "NET_NS: netcontext %p (%u) destroyed\n",
> ns, ns->id);
> kfree(ns);
>
> _____
> Containers mailing list
> Containers@lists.osdl.org
> https://lists.osdl.org/mailman/listinfo/containers
>
```

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Subject: Re: [PATCH 12/12] network namespace: L2 and L3 intro  
Posted by [Mishin Dmitry](#) on Thu, 07 Dec 2006 11:29:05 GMT  
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---

On Thursday 07 December 2006 12:34, Cedric Le Goater wrote:  
> I have issues with the hunks below. they don't apply :(  
>

> Can I have an updated version ? and I'll release the full patchset ASAP.  
Sorry, forgot to refresh.

---

Introduce two kind of network namespaces - level 2 and level 3. First one is namespace with full set of networking objects, while second one - socket-level with restricted set.

Signed-off-by: Dmitry Mishin <dim@openvz.org>

---

```
drivers/net/veth.c          | 2 -
include/linux/net_namespace.h | 5 +++-
include/linux/nsproxy.h     | 5 +++-
include/linux/sched.h       | 2 +
kernel/fork.c               | 3 +-
kernel/nsproxy.c            | 5 +++-
net/core/net_namespace.c    | 43 ++++++-----
7 files changed, 45 insertions(+), 20 deletions(-)
```

--- linux-2.6.19-rc6-mm2.orig/drivers/net/veth.c

+++ linux-2.6.19-rc6-mm2/drivers/net/veth.c

```
@@ -320,7 +320,7 @@ static ssize_t veth_debug_write(struct f
    id = simple_strtoul(s + 1, &s, 0);
    err = sys_bind_ns(id, NS_ALL);
} else
- err = sys_unshare_ns(NS_NET);
+ err = sys_unshare_ns(NS_NET2);
if (err)
    goto out;
/* after bind_ns() or unshare_ns() namespace is changed */
```

--- linux-2.6.19-rc6-mm2.orig/include/linux/net\_namespace.h

+++ linux-2.6.19-rc6-mm2/include/linux/net\_namespace.h

```
@@ -27,6 +27,9 @@ struct net_namespace {
    struct net_namespace *parent;
    struct list_head child_list, sibling_list;
    unsigned int id;
+#define NET_NS_LEVEL2 1
+#define NET_NS_LEVEL3 2
+ unsigned int level;
};
```

```
extern struct net_namespace init_net_ns;
```

```
@@ -85,7 +88,7 @@ static inline void get_net_ns(struct net
static inline int unshare_net_ns(unsigned long unshare_flags,
    struct net_namespace **new_net)
{
- if (unshare_flags & NS_NET)
```



```

+ if (!(flags & (NS_NET2 | NS_NET3)))
    return -EINVAL;

    return 0;
--- linux-2.6.19-rc6-mm2.orig/include/linux/nsproxy.h
+++ linux-2.6.19-rc6-mm2/include/linux/nsproxy.h
@@ -20,9 +20,10 @@ struct user_namespace;
#define NS_UTS 0x00000002
#define NS_IPC 0x00000004
#define NS_PID 0x00000008
-#define NS_NET 0x00000010
+#define NS_NET2 0x00000010
#define NS_USER 0x00000020
-#define NS_ALL (NS_MNT|NS_UTS|NS_IPC|NS_PID|NS_NET|NS_USER)
+#define NS_NET3 0x00000040
+#define NS_ALL (NS_MNT|NS_UTS|NS_IPC|NS_PID|NS_NET2|NS_USER)

/*
 * A structure to contain pointers to all per-process
--- linux-2.6.19-rc6-mm2.orig/include/linux/sched.h
+++ linux-2.6.19-rc6-mm2/include/linux/sched.h
@@ -26,6 +26,8 @@
#define CLONE_STOPPED 0x02000000 /* Start in stopped state */
#define CLONE_NEWUTS 0x04000000 /* New utsname group? */
#define CLONE_NEWIPC 0x08000000 /* New ipcns */
+#define CLONE_NEWNET2 0x10000000 /* New level 2 network namespace */
+#define CLONE_NEWNET3 0x20000000 /* New level 3 network namespace */

/*
 * Scheduling policies
--- linux-2.6.19-rc6-mm2.orig/kernel/fork.c
+++ linux-2.6.19-rc6-mm2/kernel/fork.c
@@ -1627,7 +1627,8 @@ asmlinkage long sys_unshare(unsigned lon
    err = -EINVAL;
    if (unshare_flags & ~(CLONE_THREAD|CLONE_FS|CLONE_NEWNS|CLONE_SIGHAND|
        CLONE_VM|CLONE_FILES|CLONE_SYSVSEM|
-    CLONE_NEWUTS|CLONE_NEWIPC))
+    CLONE_NEWUTS|CLONE_NEWIPC|CLONE_NEWNET2|
+    CLONE_NEWNET3))
        goto bad_unshare_out;

    if ((err = unshare_thread(unshare_flags)))
--- linux-2.6.19-rc6-mm2.orig/kernel/nsproxy.c
+++ linux-2.6.19-rc6-mm2/kernel/nsproxy.c
@@ -120,7 +120,8 @@ int copy_namespaces(int flags, struct ta

    get_nsproxy(old_ns);

```

```

- if (!(flags & (CLONE_NEWNS | CLONE_NEWUTS | CLONE_NEWIPC)))
+ if (!(flags & (CLONE_NEWNS | CLONE_NEWUTS | CLONE_NEWIPC |
+   CLONE_NEWNET2 | CLONE_NEWNET3)))
    return 0;

    new_ns = clone_namespaces(old_ns);
@@ -329,7 +330,7 @@ static int switch_ns(int id, unsigned lo
    put_pid_ns(new_ns->pid_ns);
    new_ns->pid_ns = ns->pid_ns;
}
- if (flags & NS_NET) {
+ if (flags & (NS_NET2 | NS_NET3)) {
    get_net_ns(ns->net_ns);
    put_net_ns(new_ns->net_ns);
    new_ns->net_ns = ns->net_ns;
--- linux-2.6.19-rc6-mm2.orig/net/core/net_namespace.c
+++ linux-2.6.19-rc6-mm2/net/core/net_namespace.c
@@ -32,13 +32,19 @@ struct net_namespace init_net_ns = {

/*
 * Clone a new ns copying an original net ns, setting refcount to 1
+ * @level: level of namespace to create
 * @old_ns: namespace to clone
- * Return NULL on error (failure to kcalloc), new ns otherwise
+ * Return ERR_PTR on error, new ns otherwise
 */
-static struct net_namespace *clone_net_ns(struct net_namespace *old_ns)
+static struct net_namespace *clone_net_ns(unsigned int level,
+ struct net_namespace *old_ns)
{
    struct net_namespace *ns;

+ /* level 3 namespaces are incomplete in order to have childs */
+ if (current_net_ns->level == NET_NS_LEVEL3)
+ return ERR_PTR(-EPERM);
+
    ns = kcalloc(sizeof(struct net_namespace), GFP_KERNEL);
    if (!ns)
        return NULL;
@@ -55,19 +61,24 @@ static struct net_namespace *clone_net_n
    list_add_tail(&ns->sibling_list, &old_ns->child_list);
    spin_unlock_irq(&net_ns_list_lock);

+ if (level == NET_NS_LEVEL2) {
+ #ifdef CONFIG_IP_MULTIPLE_TABLES
- INIT_LIST_HEAD(&ns->fib_rules_ops_list);
+ INIT_LIST_HEAD(&ns->fib_rules_ops_list);
+ #endif

```

```

- if (ip_fib_struct_init(ns))
- goto out_fib4;
+ if (ip_fib_struct_init(ns))
+ goto out_fib4;
+ }
+ ns->level = level;
  if (loopback_init(ns))
    goto out_loopback;
- printk(KERN_DEBUG "NET_NS: created new netcontext %p for %s "
- "(pid=%d)\n", ns, current->comm, current->tgid);
+ printk(KERN_DEBUG "NET_NS: created new netcontext %p, level %u, "
+ "for %s (pid=%d)\n", ns, (ns->level == NET_NS_LEVEL2) ?
+ 2 : 3, current->comm, current->tgid);
  return ns;

```

out\_loopback:

```

- ip_fib_struct_cleanup();
+ if (level == NET_NS_LEVEL2)
+ ip_fib_struct_cleanup();
out_fib4:
  BUG_ON(atomic_read(&ns->kref.refcount) != 1);
  kfree(ns);
@@ -80,17 +91,22 @@ out_fib4:
int unshare_net_ns(unsigned long unshare_flags,
    struct net_namespace **new_net)
{
- if (unshare_flags & NS_NET) {
+ unsigned int level;
+
+ if (unshare_flags & (NS_NET2 | NS_NET3)) {
  if (!capable(CAP_SYS_ADMIN))
    return -EPERM;

- *new_net = clone_net_ns(current->nsproxy->net_ns);
- if (!*new_net)
- return -ENOMEM;
+ level = (unshare_flags & NS_NET2) ? NET_NS_LEVEL2 :
+ NET_NS_LEVEL3;
+ *new_net = clone_net_ns(level, current->nsproxy->net_ns);
+ if (IS_ERR(*new_net))
+ return PTR_ERR(*new_net);
}

```

return 0;

}

```
+EXPORT_SYMBOL(unshare_net_ns);
```

```
int copy_net_ns(int flags, struct task_struct *tsk)
```

```
{
@@ -127,7 +143,8 @@ void free_net_ns(struct kref *kref)
    ns, atomic_read(&ns->kref.refcount));
    return;
}
- ip_fib_struct_cleanup();
+ if (ns->level == NET_NS_LEVEL2)
+ ip_fib_struct_cleanup();
    printk(KERN_DEBUG "NET_NS: net namespace %p (%u) destroyed\n",
        ns, ns->id);
    kfree(ns);
```

---

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