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Subject: [patch 2/5][RFC - ipv4/udp checkpoint/restart] : provide compilation option and genetlink framework

Posted by [Daniel Lezcano](#) on Wed, 06 Jun 2007 12:18:08 GMT

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This patchset provide the AF\_INET C/R option in the makefile and a generic netlink framework for passing the socket messages.

It seems that we are encouraged to use netlink instead of the /proc, /sysfs, ioctls: <http://kerneltrap.org/node/6637>

I found that there is a lot of advantages to use the netlink:

- \* the protocol is secure
- \* the protocol will describe the socket attributes and obviously brings a little abstraction layer with the internal kernel structure/data type. This is a good way to implement ascendant compatibility (eg. move a socket to a kernel with an upper version)
- \* the amount of socket informations is variable. With netlink, we don't need to take care of the size of the data (eg. just read data until there is something)
- \* the netlink attributes can be directly dumped to disk and reused to restore the socket or examined for specific processing (I don't have example).

Signed-off-by: Daniel Lezcano <dlezcano@fr.ibm.com>

---

```
include/linux/af_inet_cr.h | 15 ++++++
net/ipv4/Kconfig           | 8 +++
net/ipv4/Makefile          | 1
net/ipv4/af_inet_cr.c      | 119 ++++++
4 files changed, 143 insertions(+)
```

Index: 2.6.20-cr/net/ipv4/Kconfig

=====

--- 2.6.20-cr.orig/net/ipv4/Kconfig

+++ 2.6.20-cr/net/ipv4/Kconfig

@@ -1,6 +1,14 @@

#

# IP configuration

#

+config IP\_CR

+ tristate "IP: checkpoint/restart"

+ help

+ The checkpoint/restart allows to dump the sockets states and

+ the associated protocols internals to the userspace land.

+ The data can be reused to recreate the socket in the same state.

+ It's safe to say N.

+

```
config IP_MULTICAST
bool "IP: multicasting"
help
```

```
Index: 2.6.20-cr/net/ipv4/Makefile
```

```
=====
--- 2.6.20-cr.orig/net/ipv4/Makefile
```

```
+++ 2.6.20-cr/net/ipv4/Makefile
```

```
@ @ -53,3 +53,4 @ @
```

```
obj-$(CONFIG_XFRM) += xfrm4_policy.o xfrm4_state.o xfrm4_input.o \
    xfrm4_output.o
```

```
+obj-$(CONFIG_IP_CR) += af_inet_cr.o
```

```
Index: 2.6.20-cr/net/ipv4/af_inet_cr.c
```

```
=====
--- /dev/null
```

```
+++ 2.6.20-cr/net/ipv4/af_inet_cr.c
```

```
@ @ -0,0 +1,119 @ @
```

```
+/*
```

```
+ * Copyright (C) 2007 IBM Corporation
```

```
+ *
```

```
+ * Author: Daniel Lezcano <dlezcano@fr.ibm.com>
```

```
+ *
```

```
+ * This program is free software; you can redistribute it and/or
```

```
+ * modify it under the terms of the GNU General Public License as
```

```
+ * published by the Free Software Foundation, version 2 of the
```

```
+ * License.
```

```
+ */
```

```
+
```

```
+#include <net/genetlink.h>
```

```
+#include <net/sock.h>
```

```
+#include <linux/fs.h>
```

```
+#include <linux/af_inet_cr.h>
```

```
+
```

```
+/*
```

```
+ * af_inet_cr_nldump : this function is called when a netlink message is received
```

```
+ * with AF_INET_CR_CMD_DUMP command.
```

```
+ * @skb : the netlink packet giving the restore command
```

```
+ * @info : the generic netlink message
```

```
+ */
```

```
+static int af_inet_cr_nldump(struct sk_buff *skb, struct genl_info *info)
```

```
+{
```

```
+ return 0;
```

```
+}
```

```
+
```

```
+/*
```

```
+ * af_inet_cr_nldump : this function is called when a netlink message is received
```

```
+ * with AF_INET_CR_CMD_RESTORE command.
```

```
+ * @skb : the netlink packet giving the restore command
```

```

+ * @info : the generic netlink message
+ */
+static int af_inet_cr_nlrestore(struct sk_buff *skb, struct genl_info *info)
+{
+ return 0;
+}
+
+/*
+ * Netlink message policy definition
+ */
+static struct nla_policy af_inet_cr_policy[AF_INET_CR_ATTR_MAX] = {
+ [AF_INET_CR_ATTR_INODE] = { .type = NLA_U32 },
+};
+
+/*
+ * Netlink dumping command configuration
+ */
+static struct genl_ops af_inet_cr_nldump_ops = {
+ .cmd = AF_INET_CR_CMD_DUMP,
+ .doit = af_inet_cr_nldump,
+ .policy = af_inet_cr_policy,
+};
+
+/*
+ * Netlink restore command configuration
+ */
+static struct genl_ops af_inet_cr_nlrestore_ops = {
+ .cmd = AF_INET_CR_CMD_RESTORE,
+ .doit = af_inet_cr_nlrestore,
+ .policy = af_inet_cr_policy,
+};
+
+/*
+ * Generic netlink family definition
+ */
+static struct genl_family af_inet_cr_family = {
+ .id = GENL_ID_GENERATE,
+ .name = "af_inet_cr",
+ .version = 0x1,
+ .maxattr = AF_INET_CR_ATTR_MAX - 1,
+};
+
+/*
+ * af_inet_cr_init : this function is called at initialization
+ * time. It register the generic netlink family associated with
+ * this module and hang different ops with it.
+ */
+static __init int af_inet_cr_init(void)

```

```

+{
+ int err;
+
+ err = genl_register_family(&af_inet_cr_family);
+ if (err < 0)
+ goto out;
+
+ err = genl_register_ops(&af_inet_cr_family,
+ &af_inet_cr_nldump_ops);
+ if (err < 0)
+ goto out_unregister_fam;
+
+ err = genl_register_ops(&af_inet_cr_family,
+ &af_inet_cr_nlrestore_ops);
+ if (err < 0)
+ goto out_unregister_dump;
+
+ return 0;
+
+out_unregister_dump:
+ genl_unregister_ops(&af_inet_cr_family, &af_inet_cr_nldump_ops);
+out_unregister_fam:
+ genl_unregister_family(&af_inet_cr_family);
+out:
+ return err;
+}
+
+/*
+ * af_inet_cr_exit : this function is called at exit time. It unregister
+ * the generic netlink family.
+ */
+static __exit void af_inet_cr_exit(void)
+{
+ genl_unregister_ops(&af_inet_cr_family, &af_inet_cr_nlrestore_ops);
+ genl_unregister_ops(&af_inet_cr_family, &af_inet_cr_nldump_ops);
+ genl_unregister_family(&af_inet_cr_family);
+}
+
+module_init(af_inet_cr_init);
+module_exit(af_inet_cr_exit);
Index: 2.6.20-cr/include/linux/af_inet_cr.h
=====
--- /dev/null
+++ 2.6.20-cr/include/linux/af_inet_cr.h
@@ -0,0 +1,15 @@
+#ifndef _AF_INET_CR_H
+#define _AF_INET_CR_H
+enum {

```

```
+ AF_INET_CR_CMD_UNSPEC,  
+ AF_INET_CR_CMD_DUMP,  
+ AF_INET_CR_CMD_RESTORE,  
+ AF_INET_CR_CMD_MAX  
+};  
+  
+enum {  
+ AF_INET_CR_ATTR_UNSPEC,  
+ AF_INET_CR_ATTR_INODE,  
+ AF_INET_CR_ATTR_MAX  
+};  
+#endif
```

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