



Silent Configuration for Broadcom Advance Server Program (BASP)

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1 Revision History

Version	Date	Author	Changes
6.1.10	09/06/07	Jason Hsu	Updated Exit Codes.
6.1.9	04/10/07	Jason Hsu	The Team to be created has to include at least one Broadcom NIC.
6.1.7	07/18/06	Su-Lan Wang	For incremental version control, no document changes.
6.1.6	04/25/06	Su-Lan Wang	Added optional parameter -livelink_vid for live link team configuration. Updated 'Command Line Input Parameters', and 'Examples' sections.
6.1.5	09/22/05	Su-Lan Wang	Added administrator privilege to 'Requirements'. Modified 'Examples' in Section 4.1 and Section 4.2. Appended error code 560 in Section 'Exit Codes'.
6.1.4	05/11/05	Su-Lan Wang	For incremental version control, no document changes.
6.1.3	05/06/05	Su-Lan Wang	Changed input unit for -freq and -retry_freq from seconds to milliseconds. Updated 'Command Line Input Parameters', and 'Examples' sections for BaspSCfg release 6.1.3.
6.1.2	04/12/05	Su-Lan Wang	Updated 'Requirements', 'Command Line Input Parameters', and 'Examples' sections for BaspSCfg release 6.1.2.
1.4	04/07/05	Su-Lan Wang	Modified examples for live link feature.
1.3	04/01/05	Su-Lan Wang	Added options and requirements to support live link feature.
1.2	09/28/04	Daniel Tran	Modify the requirements section.
1.1	09/21/04	Daniel Tran	Add new options: -restore, -remove, and -save and exit codes.
1.0	09/16/04	Daniel Tran	Update the options list.
0.9	03/18/04	Daniel Tran	Add new error code.

0.8	02/02/04	Daniel Tran	Add watermark and convert to PDF file.
0.7	01/22/04	Daniel Tran	Add –wsp and –wss options. The options allow to set IP addresses for Primary and Secondary WINS Servers.
0.6	10/16/03	Daniel Tran	Add –gw and –dns options
0.5	02/28/03	Daniel Tran	Add more information in Requirements and Implementation sections.
0.4	02/10/03	Daniel Tran	Added more exit codes, -snic option for standby physical adapter, and examples.
0.3	02/06/03	Daniel Tran	Modified exit codes and –pnic option.
0.2	01/30/03	Daniel Tran	Added exit codes and revision page
0.1	12/27/02	Hao-Yang Feng	Created

2 Introduction

Broadcom Advance Server Program (BASP) is a Load-Balance/Fail-Over driver that offers fault tolerance capability to users. BASP allows users to choose different load balancing algorithms (Smart Load Balancing, FEC/GEC and 802.3AD) as well as VLAN tagging.

Due to the rich set of features offered by BASP, configuration is always a complicated task for users. This issue also becomes a difficult problem for an OEM that wishes to have a simple deployment method for their dual LOM (LAN-On-Motherboard) machines.

To alleviate the problem, a silent configuration utility (BaspSCfg.exe) is provided to help the OEM overcome the difficulty. The utility is a Win32 Console Mode executable that takes parameters as teaming configuration options to construct a team and no user interaction is required. OEMs can wrap the utility into their own configuration software to achieve their deployment purposes.

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3 Requirements

The silent configuration utility (BaspSCfg.exe) will conform to following requirements.

- Assume BASP is installed on the target system.
- The BMAPI dependency files will be packaged along with each BaspSCfg release and require to be installed as follows:
 1. Copy BASFND.sys to your windows\system32\drivers directory.
 2. Copy BMAPI.dll to your windows\system32 directory.
- Implement as a console mode program.
- Take parameters as configuration options.
- Make no interaction with users.
- Exit with a pre-defined error code to help the caller (that invokes the utility) to determine the result.
- Use MAC address or PCI information to identify a NIC. The format for the PCI information is “%02x:%02x.%01x”, e.g. 03:0c.1, as shown in linux lspci.
- Will have an option to take a plain text file that contains configuration information to all teams.
- Run on W2K, XP or later.
- Will configure ONLY static IP address/subnetmask, gateway, DNS, and WINS per virtual adapter. Allow multiple IP settings.
- Will create, remove, save and restore team(s)
- Will create only one team via command line, multiple teams can be created using configuration file
- Windows Management Instrumentation (WMI) service needs to be running for static IP configuration.
- Requirements for the live link feature implemented in BaspSCfg are defined in “BCM 5700 Software Release Version 7.7 Marketing Requirements, Revision 1.0g”.
- The ‘save’ and ‘help’ commands are available to all users, other commands for the teaming configuration are only available to the users with Administrator privileges.
- Team to be created must include at least one Broadcom NIC.

4 Implementation

'BaspSCfg.exe' will be implemented as a Win32 Console Mode program to reduce the dependency on various Windows OS. 'BaspSCfg.exe' will use Broadcom Management API (BMAPI) to configure or remove BASP teams. Since the utility runs independently, the package of the utility will include BMAPI files (bmapi.dll and BASFND.sys).

4.1 Command Line Input Parameters

Command line options are defined as following. All options are case insensitive.

```
BaspSCfg { [-file CFG_file] |
            [-restore file_path_name] |
            [-remove [team_name]] |
            [-save file_path_name -nicid MACADDR|PCIINFO] |
            [-name team_name [-type team_type]
            [NO_LIVELINK_PARAMS|LIVELINK_PARAMS] [IP_CFG|VLAN_CFG]] |
            [-help|-h|-?]}

{}: The parameter must exist
[]: Optional option
-file CFG_file: CFG_file is the input configuration file
               name.
-restore file_path_name: Restore the configuration from the
                       parameter file_path_name.
-remove [team_name]: Remove a team specified by the parameter
                    team_name. If team_name is not specified
                    then all team(s) will be removed.
-save file_path_name -nicid MACADDR|PCIINFO:
      Save the current configuration to the
      parameter file_path_name. MACADDR and
      PCIINFO simply tells BASPSCfg to save the
      NIC ID by MAC address or PCI bus:dev.func
      information. The NIC identification of a
      NIC will be saved in the format of MAC
      address (as MAC_Address) or PCI ID format
      (06:0D.1) as shown in linux lspci.
      The IP settings will be ignored if DHCP is
      enabled.
-name team_name: team_name is name of the team.
-type team_type: team_type is type of the team. Default is
               0.
               0: Smart Load Balance and Fail Over.
               1: Generic Trunking (FEC/GEC).
               2: Link Aggregation (802.3ad).
               4: SLB (Auto-Fallback Disable).
NO_LIVELINK_PARAMS: [PHY_NIC_SEL
                    [-snic MAC_address|bus:dev.func] ]
PHY_NIC_SEL: -pnic MAC_address|bus:dev.func
              [PHY_NIC_SEL]
              -pnic: Specify primary NIC by using MAC
              address of a 12 digit hex string or PCI
              bus:dev.func information, e.g. 03:0C.0.
LIVELINK_PARAMS: [-target_ip ip1
                  [-target_ip ip2 [-target_ip ip3 [-
                  target_ip ip4]]]
                  [-retry retry_num] [-freq interval]
                  [-retry_freq retry_interval]
```



```
[-livelink_vid ll_vid]
[LIVELINK_PNIC_SEL] [LIVELINK_SNIC_SEL] ]
-target_ip ip1 [-target_ip ip2 [-target_ip ip3 [-target_ip ip4]]]:
Up to 4 link targets can be specified. At
least one ip is required for the live link
feature.
-retry retry_num: The maximum number of retries before
failing a team member. Default is 5.
-freq interval: The frequency (in milliseconds) to send
out a link packet. Default is 2000
milliseconds.
Note: 1000 milliseconds = 1 second.
Please check BACS for valid values.
-retry_freq retry_interval: The frequency (in milliseconds)
for sending a link packet after a dropped
packet is detected. Default is 1000
milliseconds.
Note: 1000 milliseconds = 1 second.
Please check BACS for valid values.
-livelink_vid ll_vid: VLAN ID (0-4094) for live link.
One per live link team configuration.
LIVELINK_PNIC_SEL: -pnic MAC_address|bus:dev.func -
livelink_ip ll_ip [LIVELINK_PNIC_SEL]
-livelink_ip ll_ip: a static ip address is required for this
primary NIC to support live link feature.
LIVELINK_SNIC_SEL: -snic MAC_address|bus:dev.func -
livelink_ip ll_ip
-livelink_ip ll_ip: a static ip address is required for this
standby NIC to support live link feature.
IP_CFG: IP_ADDR [GATE_ADDR] [DNS_ADDR] [WNS_ADDR]
IP_ADDR: -ip IP_address -smask subnetmask [IP_ADDR]
GATE_ADDR: -gw gateway IP address [GATE_ADDR]
DNS_ADDR: -dns DNS_IP_address [DNS_ADDR]
WNS_ADDR: -wsp Primary_WINS_Server_IP_address
[-wss Secondary_WINS_Server_IP_address]
VLAN_CFG: -vname VLAN_name -vid VLAN_id [IP_CFG]
[VLAN_CFG]
VLAN_name: VLAN_name is name of VLAN.
VLAN_id: VLAN_id is the ID of VLAN and
must be between 0 and 4094.
-help: Print the usage.
-h Print the usage.
-?: Print the usage.
```

‘PHY_NIC_SEL’ option allows selection of multiple physical network adapters.

‘-pnic’ option is for load balance adapters and ‘-snic’ is for standby adapter. Each Load Balance team allows only one standby adapter. FEC/GEC or 802.3ad team cannot have a standby adapter.

When ‘IP_CFG’ is specified, user MUST set both IP and subnet mask or it will be ignored. At least one of the team members MUST have link as WMI is used to set the static IP address and requires link.

‘VLAN_CFG’ option allows configuration for multiple VLANs. Each ‘-vname’ MUST couple with ‘-vid’ or the VLAN configuration will be ignored.

The default behavior of 'BaspSCfg.exe' (without any options) will grab all 'teamable' physical network adapters into a Smart Load Balancing (SLB) team without VLAN configured and the virtual adapter of the team will use DHCP. A NIC is 'teamable' or not will depend on the specific OEM. The default team name will be "SLBTeam".

If the -pnic option is omitted then BaspSCfg.exe will also grab all 'teamable' physical network adapters into a new team.

In addition, the following requirements are implemented to support the live link feature as documented in "BCM 5700 Software Release Version 7.7 Marketing Requirements, Revision 1.0g".

- Live link support is only for the SLB team type 0.
0: Smart Load Balance and Fail Over
- '-target_ip' is the target IP address that a link packet is sent to. Up to 4 link targets can be specified for each team. At least one IP address is required to enable the live link feature. All 'target_ip' are required to be grouped together, otherwise, an error will be reported. When 'IP_CFG' is specified with the live link feature, at least one of the team members MUST have link as WMI is used to set the static IP address and requires link.
- '-retry' is the maximum number of retries before failing a team member. It is an optional parameter. Default is 5.
- '-freq' is the frequency in milliseconds to send out a link packet. It is an optional parameter. Default is 2000 milliseconds. Note: 1000 milliseconds = 1 second. The supported values by BACS (in milliseconds) are: 500 (optional), 1000, 2000, 5000, 10000, 20000, 30000, and 60000.
- '-retry_freq' is the frequency in milliseconds a link packet is to be sent after a dropped link packet is detected. It is an optional parameter. Default is 1000 milliseconds. Note: 1000 milliseconds = 1 second. The supported values by BACS (in milliseconds) are: 500 (optional), 1000, 2000, 5000, 10000, 20000, 30000, and 60000.
- '-livelink_vid' is VLAN ID for live link. One per live link team configuration. It is an optional parameter with valid range from 0 to 4094.
- Once a '-target_ip' is supplied to request the live link feature, every '-pnic' and '-snic' after the '-target_ip' is required to specify '-livelink_ip' as shown in 'LIVELINK_PNIC_SEL' and 'LIVELINK_SNIC_SEL'.
- If the live link feature is desired for a team, it is required to specify the team parameters following the 'LIVELINK_PARAMS'. Otherwise, follow the 'NO_LIVELINK_PARAMS' to input parameters for a team without the live link feature.

Examples:

BaspSCfg will create a default Load Balance SLBTeam with all 'teamable' physical network adapters and configure SLBTeam with DHCP.

BaspSCfg -name FGTeam -type 1 -pnid 00101801794D will create a FEC/GEC FGTeam with one load balance physical adapter.

BaspSCfg -name BRCMTeam -pnid 00101801794D -snid 01:0D.0 -vname VLAN100 -vid 100 -vname VLAN200 -vid 200 will create a Load Balance BRCMTeam with two VLANs and configure VLAN100 and VLAN200 with DHCP.

BaspSCfg -name BRCMTeam -pnid 00101801794D -snid 00:0B.2 -vname VLAN100 -vid 100 -ip 172.16.8.100 -smask 255.255.255.0 -vname VLAN200 -vid 200 -ip 172.16.8.200 -smask 255.255.255.0 will create a Load Balance BRCMTeam with two VLANs and configure VLAN100 and VLAN200 with static IP address and subnet mask.

BaspSCfg -name LiveLinkTeam -target_ip 172.16.8.66 -target_ip 172.16.8.77 -target_ip 172.16.8.88 retry 3 -livelink_vid 1234 -pnid 02:0A.1 -livelink_ip 172.16.8.10 -snid 00101801794D -livelink_ip 172.16.8.20 -vname VLAN100 -vid 100 -ip 172.16.8.100 -smask 255.255.255.0 -vname VLAN200 -vid 200 -ip 172.16.8.200 -smask 255.255.255.0 will create a SLB LiveLinkTeam supporting live link feature with two VLANs and configure VLAN100 and VLAN200 with static IP address and subnet mask.

'BaspSCfg -file TeamConfig.txt' will create team(s) from the input TeamConfig.txt configuration file.

'BaspSCfg -restore RstConfig' will create team(s) from the input RstConfig configuration file.

'BaspSCfg -save SaveMac.txt -nicid MACADDR' will save current teams' configuration with NIC address in the MAC address format into the designated file SaveMac.txt.

'BaspSCfg -save SavePci -nicid PCIINFO' will save current teams' configuration with NIC address in the PCI ID format into the designated file SavePci.

'BaspSCfg -remove BRCMTeam' will remove only the specified BRCMTeam if it exists.

'BaspSCfg -remove' will remove all teams found in the system.

4.2 Configuration File

The syntax plain text file is defined as following. The team parameters can be specified either using 'NO_LIVELINK_PARAMS' or using 'LIVELINK_PARAMS'.

```
TEAM_CFG
[TEAM_CFG]
...
```

1. Each 'TEAM_CFG' with NO_LIVELINK_PARAMS is defined as follows:

```
name: team_name
[type: team_type]
pnice: MAC_address
[pnive: MAC_address
...]
[snice: MAC_address]
[[ip: IP_address
smask: subnetmask]
| [vname: VLAN_name
vid: VLAN_ID
[ip: IP_address
smask: subnetmask]]
...]
```

2. Each 'TEAM_CFG' with LIVELINK_PARAMS is defined as follows:

```
name: livelinkteam name
[type: livelink_team_type]
target_ip: ip1
[target_ip: ip2
target_ip: ip3
target_ip: ip4]
[retry: 3]
[freq: 2000]
[retry_freq: 2000]
[livelink_vid: 1234]
[pnive: MAC_addresses | PCIINFO
livelink_ip: ll_ip
pnive: MAC_address | PCIINFO
livelink_ip: ll_ip
pnive:...]
[snice: MAC_address | PCIINFO
livelink_ip: ll_ip]
[[ip: IP_address
smask: subnetmask]
| [vname: VLAN_name
vid: VLAN_ID
[ip: IP_address
smask: subnetmask]]
...]
```

A configuration file **MUST** contain at least one team configuration.

'BaspSCfg.exe' will recognize 'name' as starting point of a team configuration section. All lines after 'name' will apply to the 'team_name' until another 'name' or end of file is encountered.

Each team configuration **MUST** contain at least one physical network adapter or the configuration of the team will be ignored.

If 'type' is missing, the default is set to Smart Load Balancing (SLB).

If 'ip' is set, 'smask' must also be set or 'ip' will be ignored. If 'ip' is not set, DHCP will be used.

Team IP can be set if no VLAN are configured. If any VLAN is configured, the team IP will be ignored. Multiple VLAN configurations are allowed. Each VLAN configuration allows an optional static IP information. Each IP **MUST** be couple with 'smask' or will be ignored.

Please note that there must **at least one** white space or tab between the tag ('name', 'pnic', etc.) and the value pair ('team_name', 'MAC_address', etc.) in each line.

Example:

1. A sample of the TeamConfig.txt configuration file with NO_LIVELINK_PARAMS:

```
name: BRCMTeam
type: 1
pnic: 00101801794D
pnic: 00:0B.2
vname: VLAN2
vid: 2
vname: VLAN3
vid: 3
ip: 172.16.8.3
smask: 255.255.255.0
vname: VLAN4
vid: 4
ip: 172.16.8.4
smask: 255.255.255.0
vname: VLAN5
vid: 5
ip: 172.16.8.5
smask: 255.255.255.0
```

2. A sample of the TeamConfig.txt configuration file with LIVELINK_PARAMS:

name: LiveLinkTeam
type: 0
target_ip: 172.16.8.66
target_ip: 172.16.8.77
target_ip: 172.16.8.88
target_ip: 172.16.8.99
livelink_vid: 1234
pnid: 00101801794D
livelink_ip: 172.16.8.10
pnid: 01:0D:0
livelink_ip: 172.16.8.11
snid: 02:03:0
livelink_ip: 172.16.8.20
vname: VLAN2
vid: 2
vname: VLAN3
vid: 3
ip: 172.16.8.3
smask: 255.255.255.0
vname: VLAN4
vid: 4
ip: 172.16.8.4
smask: 255.255.255.0
vname: VLAN5
vid: 5
ip: 172.16.8.5
smask: 255.255.255.0

3. Procedures to preserve Team Configuration when upgrading BASP driver:
1. Capture the Teaming Configuration using 'BaspSCfg -save <TeamConfigFile> -nicid PCIINFO'. This will save all teams' configuration into the designated <TeamConfigFile> file.
 2. Uninstall BACS with BASP, which will remove all Teaming Configuration.
 3. Perform other desired system level updates.
 4. Install/Upgrade BACS with BASP.
 5. Restore the original Teaming Configuration using 'BaspSCfg -restore <TeamConfigFile>'. The original Team is created from the input configuration file.

Note: This process will work as long as all the NICs involved in the Team configuration of the system remain intact.

4. Procedures to deploy a Teaming Configuration on multiple identical systems:
 1. Install BACS with BASP on one of the systems using BACS Installer.
 2. Create the desired Teaming Configuration using either BACS or BaspSCfg.
 3. Use 'BaspSCfg -save <TeamConfigFile> -nicid PCIINFO' to save the Team Configuration into the <TeamConfigFile> file.
In the file, the NICs in a Team are identified by their PCI ID format.
 4. In the rollout image process, make sure that all Broadcom driver updates are completed before moving to the next step.
 5. After all network drivers updates are performed, install BACS with BASP on the new system.
 6. Install the Teaming Configuration from the input configuration file using 'BaspSCfg -restore <TeamConfigFile>'.
 7. Repeat step4 to step6 for each additional system.

Note: Make sure all the Teaming NICs used in the systems are identical and are installed in the same corresponding PCI slots.

4.3 Exit Codes

// No error	
BASPCFG_NO_ERROR	0
// Not supported OS	
ERROR_NOT_SUPPORTED_OS	500
// Cannot allocate memory	
ERROR_CANNOT_ALLOC_MEM	501
// Team has no member	
ERROR_TEAM_NO_MEMBER	502
// Only one team is accepted from command line	
ERROR_EXCEED_NUMBER_OF_TEAM_ALLOW	503
// Cannot create more than 64 VLANs	
ERROR_EXCEEDMAXVLAN	504
// Cannot open the input file	
ERROR_CANNOT_OPEN_FILE	505
// No team to configure	
ERROR_NO_TEAM_TO_CONFIG	506
// BASP is not installed and cannot create any team	
ERROR_BASP_NOT_INSTALL	507
// Cannot set static IP Address	
ERROR_CANNOT_SET_IPADDR	508
// Wrong option flag	

ERROR_WRONG_OPTION_FLAG 509

// Cannot create FECGEC or 802.3ad with a standby adapter
ERROR_CANNOT_CREATE_FECGEC_8023AD 510

// Only Broadcom certified adapters are supported in VLAN
ERROR_ONLY_BROADCOM_NIC_FOR_VLAN 511

// Duplicate adapter physical MAC address or PCI ID
ERROR_DUPLICATE_MAC_ADDRESS 512

// '&' is not a legal character for the team name
ERROR_INVALID_TEAM_NAME 513

// Team already exists, please use a different team name
ERROR_TEAM_ALREADY_EXISTED 514

// Cannot match the MAC Address
ERROR_CANNOT_MATCH_MAC_ADDR 515

// Duplicate VLAN name % or VLAN ID %d
ERROR_DUPLICATE_VLANID 516

// Team not found, please use a different team name
ERROR_TEAM_NOT_FOUND 517

// Live link support only applied to SLB team type
ERROR_CANNOT_CREATE_LIVE_LINK 518

// Live link support allows up to 4 Target IPs
ERROR_EXCEED_MAX_TARGET_IP 519

// Duplicate OPTION
ERROR_DUPLICATE_OPTION 520

// Missing parameter
ERROR_MISSING_PARAM 521

// Invalid parameter type
ERROR_INVALID_PARAM 522

// %s value %d is out of range (%d - %d)
ERROR_INVALID_RANGE 523

// Unrecognized parameter
ERROR_UNRECOGNIZED_PARAM 524

// Duplicate IP address
ERROR_DUPLICATE_IPADDR 525

// Invalid IP address
ERROR_INVALID_IPADDR 526

// No link is present for Team %s to set IP addresses
ERROR_NO_LINK_FOR_IP_CFG 527

// Invalid interval %d.

ERROR_INVALID_INTERVAL 528

// Cannot initialize BMAPI
ERROR_CANNOT_INIT_BMAPI 550

// Cannot check BASP status
ERROR_CANNOT_CHECK_BASP_STATUS 551

// Cannot get all unassigned adapters data
ERROR_CANNOT_GET_ALL_UNASG_NIC_DATA 552

// Cannot get adapter PCI information
ERROR_CANNOT_GET_NIC_PCI_INFO 553

// Cannot create team
ERROR_CANNOT_CREATE_TEAM 554

// Cannot get all unassigned adapters number
ERROR_CANNOT_GET_ALL_UNASG_NIC_NUM 555

// Cannot get all created teams
ERROR_CANNOT_GET_ALL_CREATED_TEAM 556

// Wrong BMAPI version
ERROR_WRONG_BMAPI_VERSION 557

// Cannot get physical NIC information
ERROR_CANNOT_GET_NIC_INFO 558

// Cannot remove team
ERROR_CANNOT_REMOVE_TEAM 559

// Admin Privilege is required for this operation.
ERROR_NO_ADMIN_PRIVILEGE 560

// No Broadcom adapter included when creating a Team
ERROR_NO_BRCM_NIC_IN_TEAM 561

// Too many physical NIC in a team
ERROR_TOO_MANY_PHY_NIC 562

// Error in retrieving IP address from CIM/WMI
ERROR_RETRIEVE_IP_ADDR 563

// NDIS6 driver required in Windows Vista system
ERROR_NDIS6_DRIVER_REQUIRED 564