

# Direct Programming Interface for VHDL 201x Proposal Update:

Purpose of update is to make DPI universal connection interface in mixed designes. It makes VHDL201x more effective

Mapping types:

VHDL 201x	C99	SystemVerilog	SystemC
BOOLEAN	unsigned char	bit	sc_signal<bool>
BIT	unsigned char	bit	sc_signal<sc_bit>
CHARACTER	char	byte	sc_signal<char>
INTEGER	long int	int	sc_signal<int>
REAL	double	real	sc_signal<double>
TIME	long long int	longint	sc_signal<uint64_t>
STRING	const char *	string	C99 type used ; sc_string is deprecated
STD_LOGIC	vhLogicVal	signed logic/signed reg	sc_signal<sc_logic>
STD_ULOGIC	vhLogicVal	logic/reg	sc_signal<sc_logic>
BIT_VECTOR	vhBitVecVal	bit vector (i.e bit [x:0] b)	sc_signal<sc_bv<>>
STD_LOGIC_VECTOR	vhLogicVecVal	Signed logic/reg vector (i.e signed reg [x:0] b)	sc_signal<sc_lv<>>
STD_ULOGIC_VECTOR	vhLogicVecVal	logic/reg vector (i.e reg [x:0] b)	sc_signal<sc_lv<>>
record	struct	unpacked struct	C99 type used
array	vhOpenArray	Fixed size array (number of elements must match) or container (number of dimensions must match, excluding associative arrays).	C99 type used

```
typedef uint32_t vhBitVecVal
typedef uint32_t vhLogicVal
```

```
typedef struct{
    vhLogicVal * vec;
```

```
    uint32_t size;  
}vhLogicVecVal;
```

where vhLogicVal is one of

(vhpiU, vhpiX, vhpi0, vhpi1, vhpiZ, vhpiW, vhpiL, vhpiH, vhpiDontCare) . It may be typedef to vh type

i.e vhpiU <=> vhU

```
typedef void* vhOpenArray;
```

```
int vhLeft(const vhOpenArray h, int d);  
int vhRight(const vhOpenArray h, int d);  
int vhLow(const vhOpenArray h, int d);  
int vhHigh(const vhOpenArray h, int d);  
int vhIncrement(const vhOpenArray h, int d);  
int vhSize(const vhOpenArray h, int d);  
int vhDimensions(const vhOpenArray h);
```

where d is number of argument (d=0 refers to packed dimension i.e for array of STD\_LOGIC\_VECTOR )

Additional functions:

```
void *vhGetArrayPtr(const vhOpenArray); /* returns pointer to first array first element for  
                                         read or write values */  
int vhSizeOfArray(const vhOpenArray); // total size in bytes
```

In case of arrays and records number of elements and type must match. In Case of SystemC C99 types may be used.