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***Rocky Enterprise Linux 9.2 Manual Pages on command 'provider-kdf.7ssl'***

***\$ man provider-kdf.7ssl***

PROVIDER-KDF(7SSL)                      OpenSSL                      PROVIDER-KDF(7SSL)

NAME

provider-kdf - The KDF library <-> provider functions

SYNOPSIS

```
#include <openssl/core_dispatch.h>
#include <openssl/core_names.h>
/*
 * None of these are actual functions, but are displayed like this for
 * the function signatures for functions that are offered as function
 * pointers in OSSL_DISPATCH arrays.
 */
/* Context management */
void *OSSL_FUNC_kdf_newctx(void *provctx);
void OSSL_FUNC_kdf_freectx(void *kctx);
void *OSSL_FUNC_kdf_dupctx(void *src);
/* Encryption/decryption */
int OSSL_FUNC_kdf_reset(void *kctx);
int OSSL_FUNC_kdf_derive(void *kctx, unsigned char *key, size_t keylen,
                        const OSSL_PARAM params[]);
/* KDF parameter descriptors */
const OSSL_PARAM *OSSL_FUNC_kdf_gettable_params(void *provctx);
const OSSL_PARAM *OSSL_FUNC_kdf_gettable_ctx_params(void *kctx, void *provctx);
const OSSL_PARAM *OSSL_FUNC_kdf_settable_ctx_params(void *kctx, void *provctx);
```

```

/* KDF parameters */
int OSSL_FUNC_kdf_get_params(OSSL_PARAM params[]);
int OSSL_FUNC_kdf_get_ctx_params(void *kctx, OSSL_PARAM params[]);
int OSSL_FUNC_kdf_set_ctx_params(void *kctx, const OSSL_PARAM params[]);

```

## DESCRIPTION

This documentation is primarily aimed at provider authors. See [provider\(7\)](#) for further information.

The KDF operation enables providers to implement KDF algorithms and make them available to applications via the API functions [EVP\\_KDF\\_CTX\\_reset\(3\)](#), and [EVP\\_KDF\\_derive\(3\)](#).

All "functions" mentioned here are passed as function pointers between libcrypto and the provider in [OSSL\\_DISPATCH](#) arrays via [OSSL\\_ALGORITHM](#) arrays that are returned by the provider's [provider\\_query\\_operation\(\)](#) function (see "Provider Functions" in [provider-base\(7\)](#)).

All these "functions" have a corresponding function type definition named `OSSL_FUNC_{name}_fn`, and a helper function to retrieve the function pointer from an [OSSL\\_DISPATCH](#) element named `OSSL_FUNC_{name}`. For example, the "function" [OSSL\\_FUNC\\_kdf\\_newctx\(\)](#) has these:

```

typedef void *(OSSL_OSSL_FUNC_kdf_newctx_fn)(void *provctx);
static ossl_inline OSSL_OSSL_FUNC_kdf_newctx_fn
    OSSL_FUNC_kdf_newctx(const OSSL_DISPATCH *opf);

```

[OSSL\\_DISPATCH](#) array entries are identified by numbers that are provided as macros in [openssl-core\\_dispatch.h\(7\)](#), as follows:

<code>OSSL_FUNC_kdf_newctx</code>	<code>OSSL_FUNC_KDF_NEWCTX</code>
<code>OSSL_FUNC_kdf_freectx</code>	<code>OSSL_FUNC_KDF_FREETX</code>
<code>OSSL_FUNC_kdf_dupctx</code>	<code>OSSL_FUNC_KDF_DUPCTX</code>
<code>OSSL_FUNC_kdf_reset</code>	<code>OSSL_FUNC_KDF_RESET</code>
<code>OSSL_FUNC_kdf_derive</code>	<code>OSSL_FUNC_KDF_DERIVE</code>
<code>OSSL_FUNC_kdf_get_params</code>	<code>OSSL_FUNC_KDF_GET_PARAMS</code>
<code>OSSL_FUNC_kdf_get_ctx_params</code>	<code>OSSL_FUNC_KDF_GET_CTX_PARAMS</code>
<code>OSSL_FUNC_kdf_set_ctx_params</code>	<code>OSSL_FUNC_KDF_SET_CTX_PARAMS</code>
<code>OSSL_FUNC_kdf_gettable_params</code>	<code>OSSL_FUNC_KDF_GETTABLE_PARAMS</code>
<code>OSSL_FUNC_kdf_gettable_ctx_params</code>	<code>OSSL_FUNC_KDF_GETTABLE_CTX_PARAMS</code>
<code>OSSL_FUNC_kdf_settable_ctx_params</code>	<code>OSSL_FUNC_KDF_SETTABLE_CTX_PARAMS</code>

A KDF algorithm implementation may not implement all of these functions. In order to be a consistent set of functions, at least the following functions must be implemented:

`OSSL_FUNC_kdf_newctx()`, `OSSL_FUNC_kdf_freectx()`, `OSSL_FUNC_kdf_set_ctx_params()`, `OSSL_FUNC_kdf_derive()`. All other functions are optional.

#### Context Management Functions

`OSSL_FUNC_kdf_newctx()` should create and return a pointer to a provider side structure for holding context information during a KDF operation. A pointer to this context will be passed back in a number of the other KDF operation function calls. The parameter `provctx` is the provider context generated during provider initialisation (see `provider(7)`).

`OSSL_FUNC_kdf_freectx()` is passed a pointer to the provider side KDF context in the `kctx` parameter. If it receives `NULL` as `kctx` value, it should not do anything other than return. This function should free any resources associated with that context.

`OSSL_FUNC_kdf_dupctx()` should duplicate the provider side KDF context in the `kctx` parameter and return the duplicate copy.

#### Encryption/Decryption Functions

`OSSL_FUNC_kdf_reset()` initialises a KDF operation given a provider side KDF context in the `kctx` parameter.

`OSSL_FUNC_kdf_derive()` performs the KDF operation after processing the `params` as per `OSSL_FUNC_kdf_set_ctx_params()`. The `kctx` parameter contains a pointer to the provider side context. The resulting key of the desired `keylen` should be written to `key`. If the algorithm does not support the requested `keylen` the function must return error.

#### KDF Parameters

See `OSSL_PARAM(3)` for further details on the `parameters` structure used by these functions.

`OSSL_FUNC_kdf_get_params()` gets details of parameter values associated with the provider algorithm and stores them in `params`.

`OSSL_FUNC_kdf_set_ctx_params()` sets KDF parameters associated with the given provider side KDF context `kctx` to `params`. Any parameter settings are additional to any that were previously set. Passing `NULL` for `params` should return true.

`OSSL_FUNC_kdf_get_ctx_params()` retrieves gettable parameter values associated with the given provider side KDF context `kctx` and stores them in `params`. Passing `NULL` for `params` should return true.

`OSSL_FUNC_kdf_gettable_params()`, `OSSL_FUNC_kdf_gettable_ctx_params()`, and `OSSL_FUNC_kdf_settable_ctx_params()` all return constant `OSSL_PARAM` arrays as descriptors

of the parameters that `OSSL_FUNC_kdf_get_params()`, `OSSL_FUNC_kdf_get_ctx_params()`, and `OSSL_FUNC_kdf_set_ctx_params()` can handle, respectively.

`OSSL_FUNC_kdf_gettable_ctx_params()` and `OSSL_FUNC_kdf_settable_ctx_params()` will return the parameters associated with the provider side context `kctx` in its current state if it is not `NULL`. Otherwise, they return the parameters associated with the provider side algorithm `provctx`.

Parameters currently recognised by built-in KDFs are as follows. Not all parameters are relevant to, or are understood by all KDFs:

"size" (`OSSL_KDF_PARAM_SIZE`) <unsigned integer>

Gets the output size from the associated KDF `ctx`. If the algorithm produces a variable amount of output, `SIZE_MAX` should be returned. If the input parameters required to calculate the fixed output size have not yet been supplied, 0 should be returned indicating an error.

"key" (`OSSL_KDF_PARAM_KEY`) <octet string>

Sets the key in the associated KDF `ctx`.

"secret" (`OSSL_KDF_PARAM_SECRET`) <octet string>

Sets the secret in the associated KDF `ctx`.

"pass" (`OSSL_KDF_PARAM_PASSWORD`) <octet string>

Sets the password in the associated KDF `ctx`.

"cipher" (`OSSL_KDF_PARAM_CIPHER`) <UTF8 string>

"digest" (`OSSL_KDF_PARAM_DIGEST`) <UTF8 string>

"mac" (`OSSL_KDF_PARAM_MAC`) <UTF8 string>

Sets the name of the underlying cipher, digest or MAC to be used. It must name a suitable algorithm for the KDF that's being used.

"maclen" (`OSSL_KDF_PARAM_MAC_SIZE`) <octet string>

Sets the length of the MAC in the associated KDF `ctx`.

"properties" (`OSSL_KDF_PARAM_PROPERTIES`) <UTF8 string>

Sets the properties to be queried when trying to fetch the underlying algorithm. This must be given together with the algorithm naming parameter to be considered valid.

"iter" (`OSSL_KDF_PARAM_ITER`) <unsigned integer>

Sets the number of iterations in the associated KDF `ctx`.

"mode" (`OSSL_KDF_PARAM_MODE`) <UTF8 string>

Sets the mode in the associated KDF `ctx`.

"pkcs5" (OSSL\_KDF\_PARAM\_PKCS5) <integer>

Enables or disables the SP800-132 compliance checks. A mode of 0 enables the compliance checks.

The checks performed are:

- the iteration count is at least 1000.
- the salt length is at least 128 bits.
- the derived key length is at least 112 bits.

"ukm" (OSSL\_KDF\_PARAM\_UKM) <octet string>

Sets an optional random string that is provided by the sender called "partyAInfo". In CMS this is the user keying material.

"cekalg" (OSSL\_KDF\_PARAM\_CEK\_ALG) <UTF8 string>

Sets the CEK wrapping algorithm name in the associated KDF ctx.

"n" (OSSL\_KDF\_PARAM\_SCRYPT\_N) <unsigned integer>

Sets the scrypt work factor parameter N in the associated KDF ctx.

"r" (OSSL\_KDF\_PARAM\_SCRYPT\_R) <unsigned integer>

Sets the scrypt work factor parameter r in the associated KDF ctx.

"p" (OSSL\_KDF\_PARAM\_SCRYPT\_P) <unsigned integer>

Sets the scrypt work factor parameter p in the associated KDF ctx.

"maxmem\_bytes" (OSSL\_KDF\_PARAM\_SCRYPT\_MAXMEM) <unsigned integer>

Sets the scrypt work factor parameter maxmem in the associated KDF ctx.

"prefix" (OSSL\_KDF\_PARAM\_PREFIX) <octet string>

Sets the prefix string using by the TLS 1.3 version of HKDF in the associated KDF ctx.

"label" (OSSL\_KDF\_PARAM\_LABEL) <octet string>

Sets the label string using by the TLS 1.3 version of HKDF in the associated KDF ctx.

"data" (OSSL\_KDF\_PARAM\_DATA) <octet string>

Sets the context string using by the TLS 1.3 version of HKDF in the associated KDF ctx.

"info" (OSSL\_KDF\_PARAM\_INFO) <octet string>

Sets the optional shared info in the associated KDF ctx.

"seed" (OSSL\_KDF\_PARAM\_SEED) <octet string>

Sets the IV in the associated KDF ctx.

"xcgkhash" (OSSL\_KDF\_PARAM\_SSHKDF\_XCGHASH) <octet string>

Sets the xcgkhash in the associated KDF ctx.

"session\_id" (OSSL\_KDF\_PARAM\_SSHKDF\_SESSION\_ID) <octet string>

Sets the session ID in the associated KDF ctx.

"type" (OSSL\_KDF\_PARAM\_SSHKDF\_TYPE) <UTF8 string>

Sets the SSH KDF type parameter in the associated KDF ctx. There are six supported

types:

EVP\_KDF\_SSHKDF\_TYPE\_INITIAL\_IV\_CLI\_TO\_SRV

The Initial IV from client to server. A single char of value 65 (ASCII char 'A').

EVP\_KDF\_SSHKDF\_TYPE\_INITIAL\_IV\_SRV\_TO\_CLI

The Initial IV from server to client A single char of value 66 (ASCII char 'B').

EVP\_KDF\_SSHKDF\_TYPE\_ENCRYPTION\_KEY\_CLI\_TO\_SRV

The Encryption Key from client to server A single char of value 67 (ASCII char 'C').

EVP\_KDF\_SSHKDF\_TYPE\_ENCRYPTION\_KEY\_SRV\_TO\_CLI

The Encryption Key from server to client A single char of value 68 (ASCII char 'D').

EVP\_KDF\_SSHKDF\_TYPE\_INTEGRITY\_KEY\_CLI\_TO\_SRV

The Integrity Key from client to server A single char of value 69 (ASCII char 'E').

EVP\_KDF\_SSHKDF\_TYPE\_INTEGRITY\_KEY\_SRV\_TO\_CLI

The Integrity Key from client to server A single char of value 70 (ASCII char 'F').

"constant" (OSSL\_KDF\_PARAM\_CONSTANT) <octet string>

Sets the constant value in the associated KDF ctx.

"id" (OSSL\_KDF\_PARAM\_PKCS12\_ID) <integer>

Sets the intended usage of the output bits in the associated KDF ctx. It is defined as per RFC 7292 section B.3.

## RETURN VALUES

OSSL\_FUNC\_kdf\_newctx() and OSSL\_FUNC\_kdf\_dupctx() should return the newly created provider side KDF context, or NULL on failure.

OSSL\_FUNC\_kdf\_derive(), OSSL\_FUNC\_kdf\_get\_params(), OSSL\_FUNC\_kdf\_get\_ctx\_params() and OSSL\_FUNC\_kdf\_set\_ctx\_params() should return 1 for success or 0 on error.

OSSL\_FUNC\_kdf\_gettable\_params(), OSSL\_FUNC\_kdf\_gettable\_ctx\_params() and

OSSL\_FUNC\_kdf\_settable\_ctx\_params() should return a constant OSSL\_PARAM array, or NULL if

none is offered.

## NOTES

The KDF life-cycle is described in `life_cycle-kdf(7)`. Providers should ensure that the various transitions listed there are supported. At some point the EVP layer will begin enforcing the listed transitions.

## SEE ALSO

`provider(7)`, `life_cycle-kdf(7)`, `EVP_KDF(3)`.

## HISTORY

The provider KDF interface was introduced in OpenSSL 3.0.

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3.0.2

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