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Event 4772 F: A Kerberos authentication ticket request failed.

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4771(F): Kerberos pre-authentication failed.

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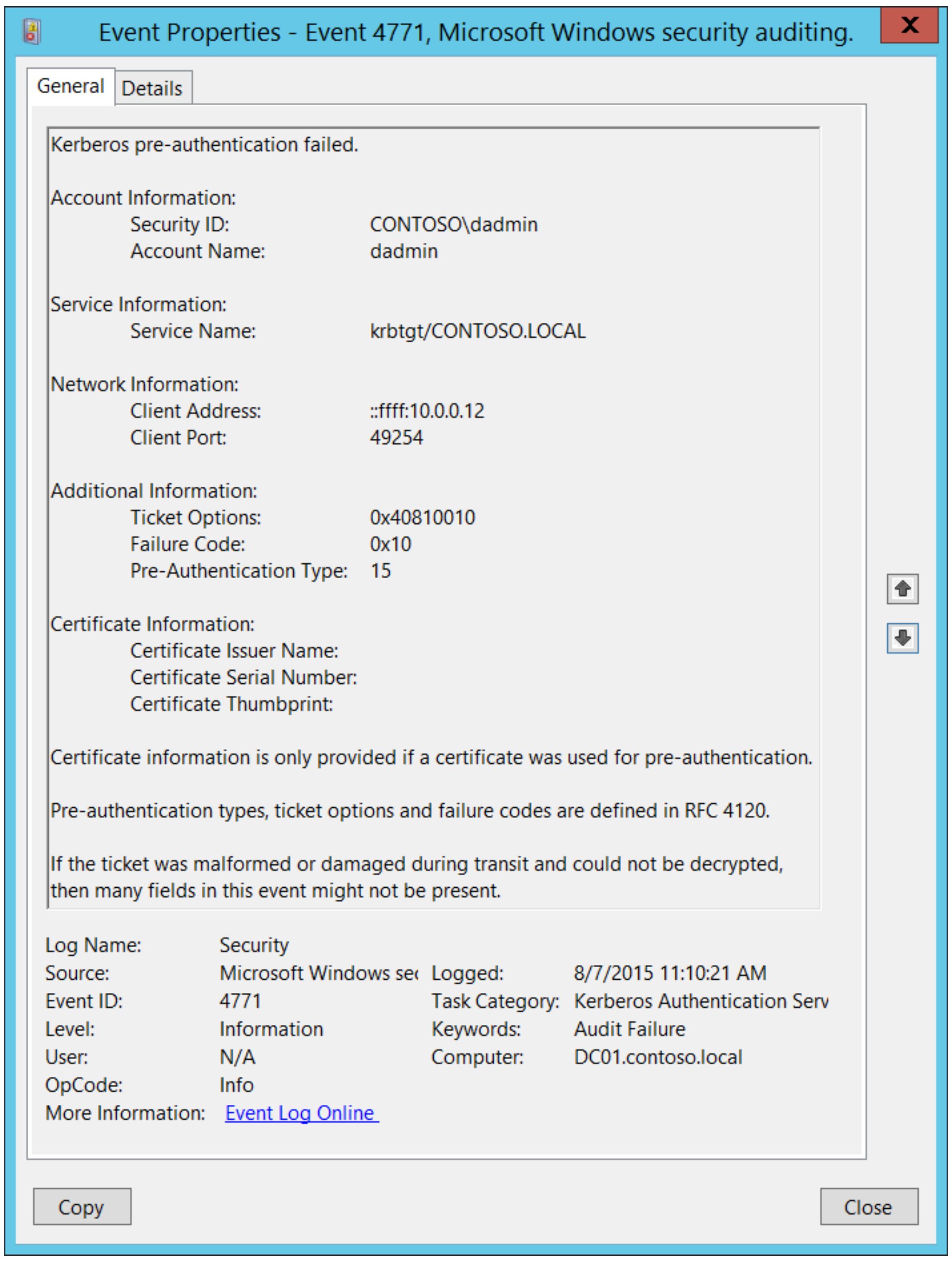

Event Properties - Event 4771, Microsoft Windows security auditing.
General
Details
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```
Kerberos pre-authentication failed.

Account Information:
        Security ID:            CONTOSO\dadmin
        Account Name:           dadmin

Service Information:
        Service Name:           krbtgt/CONTOSO.LOCAL

Network Information:
        Client Address:         ::ffff:10.0.0.12
        Client Port:            49254

Additional Information:
        Ticket Options:         0x40810010
        Failure Code:           0x10
        Pre-Authentication Type:        15

Certificate Information:
        Certificate Issuer Name:
        Certificate Serial Number:
        Certificate Thumbprint:

Certificate information is only provided if a certificate was used for pre-authentication.

Pre-authentication types, ticket options and failure codes are defined in RFC 4120.

If the ticket was malformed or damaged during transit and could not be decrypted,
then many fields in this event might not be present.

Log Name:          Security
Source:            Microsoft Windows sec    Logged:         8/7/2015 11:10:21 AM
Event ID:          4771                     Task Category:  Kerberos Authentication Serv
Level:             Information              Keywords:       Audit Failure
User:              N/A                      Computer:       DC01.contoso.local
OpCode:            Info
More Information:  Event Log Online
```

Subcategory: Audit Kerberos Authentication Service

Event Description:

This event generates every time the Key Distribution Center fails to issue a Kerberos Ticket Granting Ticket (TGT). This problem can occur when a domain controller doesn't have a certificate installed for smart card authentication (for example, with a "Domain Controller" or "Domain Controller Authentication" template), the user's password has expired, or the wrong password was provided.

This event generates only on domain controllers.

This event is not generated if "Do not require Kerberos preauthentication" option is set for the account.

> **Note** For recommendations, see Security Monitoring Recommendations for this event.

Audit Application Generated
Audit Certification Services
› Audit Detailed File Share
› Audit File Share

Event XML:

```
- <Event xmlns="http://schemas.microsoft.com/win/2004/08/events/event">
- <System>
 <Provider Name="Microsoft-Windows-Security-Auditing" Guid="{54849625-5478-4994-
 <EventID>4771</EventID>
 <Version>0</Version>
 <Level>0</Level>
 <Task>14339</Task>
 <Opcode>0</Opcode>
 <Keywords>0x8010000000000000</Keywords>
 <TimeCreated SystemTime="2015-08-07T18:10:21.495462300Z" />
 <EventRecordID>166708</EventRecordID>
 <Correlation />
 <Execution ProcessID="520" ThreadID="1084" />
 <Channel>Security</Channel>
 <Computer>DC01.contoso.local</Computer>
 <Security />
 </System>
- <EventData>
 <Data Name="TargetUserName">dadmin</Data>
 <Data Name="TargetSid">S-1-5-21-3457937927-2839227994-823803824-1104</Data>
 <Data Name="ServiceName">krbtgt/CONTOSO.LOCAL</Data>
 <Data Name="TicketOptions">0x40810010</Data>
 <Data Name="Status">0x10</Data>
 <Data Name="PreAuthType">15</Data>
 <Data Name="IpAddress">::ffff:10.0.0.12</Data>
 <Data Name="IpPort">49254</Data>
 <Data Name="CertIssuerName" />
 <Data Name="CertSerialNumber" />
 <Data Name="CertThumbprint" />
 </EventData>
 </Event>
```

Required Server Roles: Active Directory domain controller.

Minimum OS Version: Windows Server 2008.

Event Versions: 0.

Field Descriptions:

Account Information:

- **Security ID** [Type = SID]**:** SID of account object for which (TGT) ticket was requested. Event Viewer automatically tries to resolve SIDs and show the account name. If the SID cannot be resolved, you will see the source data in the event.

  For example: CONTOSO\dadmin or CONTOSO\WIN81$.

> **Note** A **security identifier (SID)** is a unique value of variable length used to identify a trustee (security principal). Each account has a unique SID that is issued by an authority, such as an Active Directory domain controller, and stored in a security database. Each time a user logs on, the system retrieves the SID for that user from the database and places it in the access token for that user. The system uses the SID in the access token to identify the user in all subsequent interactions with Windows security. When a SID has been used as the unique identifier for a user or group, it cannot ever be used again to identify another user or group. For more information about SIDs, see Security identifiers.

- **Account Name:** [Type = UnicodeString]**:** the name of account, for which (TGT) ticket was requested. Computer account name ends with **$** character.
  - User account example: dadmin
  - Computer account example: WIN81$

Service Information:

- **Service Name** [Type = UnicodeString]: the name of the service in the Kerberos Realm to which TGT request was sent. Typically has one of the following formats:
    - krbtgt/DOMAIN_NETBIOS_NAME. Example: krbtgt/CONTOSO
    - krbtgt/DOMAIN_FULL_NAME. Example: krbtgt/CONTOSO.LOCAL

Network Information:

- **Client Address** [Type = UnicodeString]**:** IP address of the computer from which the TGT request was received. Here are some examples of formats:
    - **IPv6** or **IPv4** address.
    - **::ffff:IPv4_address**.
    - **::1** - localhost.
- **Client Port** [Type = UnicodeString]: source port number of client network connection (TGT request connection).
    - 0 for local (localhost) requests.

Additional Information:

- **Ticket Options**: [Type = HexInt32]: this set of different Ticket Flags is in hexadecimal format.

  Example:

    - Ticket Options: 0x40810010
    - Binary view: 01000000100000010000000000010000
    - Using **MSB 0**-bit numbering, we have bit 1, 8, 15 and 27 set = Forwardable, Renewable, Canonicalize, Renewable-ok.

> **Note** In the table below **"MSB 0"** bit numbering is used, because RFC documents use this style. In "MSB 0" style bit numbering begins from left.
>
> | 0 | | | | | | | 7 |
> |---|---|---|---|---|---|---|---|
> | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |

The most common values:

- 0x40810010 - Forwardable, Renewable, Canonicalize, Renewable-ok
- 0x40810000 - Forwardable, Renewable, Canonicalize
- 0x60810010 - Forwardable, Forwarded, Renewable, Canonicalize, Renewable-ok

Expand table

Bit	Flag Name	Description
0	Reserved	-
1	Forwardable	(TGT only). Tells the ticket-granting service that it can issue a new TGT—based on the presented TGT—with a different network address based on the presented TGT.
2	Forwarded	Indicates either that a TGT has been forwarded or that a ticket was issued from a forwarded TGT.
3	Proxiable	(TGT only). Tells the ticket-granting service that it can issue tickets with a network address that differs from the one in the TGT.

4	Proxy	Indicates that the network address in the ticket is different from the one in the TGT used to obtain the ticket.
5	Allow-postdate	Postdated tickets SHOULD NOT be supported in KILE (Microsoft Kerberos Protocol Extension).
6	Postdated	Postdated tickets SHOULD NOT be supported in KILE (Microsoft Kerberos Protocol Extension).
7	Invalid	This flag indicates that a ticket is invalid, and it must be validated by the KDC before use. Application servers must reject tickets that have this flag set.
8	Renewable	Used in combination with the End Time and Renew Till fields to cause tickets with long life spans to be renewed at the KDC periodically.
9	Initial	Indicates that a ticket was issued using the authentication service (AS) exchange and not issued based on a TGT.
10	Pre-authent	Indicates that the client was authenticated by the KDC before a ticket was issued. This flag usually indicates the presence of an authenticator in the ticket. It can also flag the presence of credentials taken from a smart card logon.
11	Opt-hardware-auth	This flag was originally intended to indicate that hardware-supported authentication was used during pre-authentication. This flag is no longer recommended in the Kerberos V5 protocol. KDCs MUST NOT issue a ticket with this flag set. KDCs SHOULD NOT preserve this flag if it is set by another KDC.
12	Transited-policy-checked	KILE MUST NOT check for transited domains on servers or a KDC. Application servers MUST ignore the TRANSITED-POLICY-CHECKED flag.
13	Ok-as-delegate	The KDC MUST set the OK-AS-DELEGATE flag if the service account is trusted for delegation.
14	Request-anonymous	KILE does not use this flag.
15	Name-canonicalize	To request referrals, the Kerberos client MUST explicitly request the "canonicalize" KDC option for the AS-REQ or TGS-REQ.
16-25	Unused	-
26	Disable-transited-check	By default the KDC will check the transited field of a TGT against the policy of the local realm before it will issue derivative tickets based on the TGT. If this flag is set in the request, checking of the transited field is disabled. Tickets issued without the performance of this check will be noted by the reset (0) value of the TRANSITED-POLICY-CHECKED flag, indicating to the application server that the transited field must be checked locally. KDCs are encouraged but not required to honor the DISABLE-TRANSITED-CHECK option. Should not be in use, because Transited-policy-checked flag is not supported by KILE.
27	Renewable-ok	The RENEWABLE-OK option indicates that a renewable ticket will be acceptable if a ticket with the requested life cannot otherwise be provided, in which case a renewable ticket may be issued with a renew-till equal to the requested end time. The value of the renew-till field may still be limited by local limits, or limits selected by the individual principal or server.
28	Enc-tkt-in-skey	No information.
29	Unused	-
30	Renew	The RENEW option indicates that the present request is for a renewal. The ticket provided is encrypted in the secret key for the server on which it is valid. This option will only be honored if the ticket to be renewed has its RENEWABLE flag set and if the time in its renew-till field has not passed. The ticket to be renewed is passed in the padata field as part of the authentication header.

31	Validate	This option is used only by the ticket-granting service. The VALIDATE option indicates that the request is to validate a postdated ticket. Should not be in use, because postdated tickets are not supported by KILE.

> Table 6. Kerberos ticket flags.

- **Failure Code** [Type = HexInt32]**:** hexadecimal failure code of failed TGT issue operation. The table below contains the list of the error codes for this event as defined in RFC 4120:

Expand table

Code	Code Name	Description	Possible causes
0x0	KDC_ERR_NONE	No error	
0x1	KDC_ERR_NAME_EXP	Client's entry in database has expired	
0x2	KDC_ERR_SERVICE_EXP	Server's entry in database has expired	
0x3	KDC_ERR_BAD_PVNO	Requested protocol version number not supported	
0x4	KDC_ERR_C_OLD_MAST_KVNO	Client's key encrypted in old master key	
0x5	KDC_ERR_S_OLD_MAST_KVNO	Server's key encrypted in old master key	
0x6	KDC_ERR_C_PRINCIPAL_UNKNOWN	Client not found in Kerberos database	
0x7	KDC_ERR_S_PRINCIPAL_UNKNOWN	Server not found in Kerberos database	
0x8	KDC_ERR_PRINCIPAL_NOT_UNIQUE	Multiple principal entries in database	
0x9	KDC_ERR_NULL_KEY	The client or server has a null key	
0xa	KDC_ERR_CANNOT_POSTDATE	Ticket not eligible for postdating	
0xb	KDC_ERR_NEVER_VALID	Requested starttime is later than end time	
0xc	KDC_ERR_POLICY	KDC policy rejects request	
0xd	KDC_ERR_BADOPTION	KDC cannot accommodate requested option	
0xe	KDC_ERR_ETYPE_NOSUPP	KDC has no support for encryption type	

0xf	KDC_ERR_SUMTYPE_NOSUPP	KDC has no support for checksum type	
0x10	KDC_ERR_PADATA_TYPE_NOSUPP	KDC has no support for PADATA type (pre-authentication data)	Smart card logon is being attempted and the proper certificate cannot be located. This problem can happen because the wrong certification authority (CA) is being queried or the proper CA cannot be contacted in order to get Domain Controller or Domain Controller Authentication certificates for the domain controller. It can also happen when a domain controller doesn't have a certificate installed for smart cards (Domain Controller or Domain Controller Authentication templates).
0x11	KDC_ERR_TRTYPE_NOSUPP	KDC has no support for transited type	
0x12	KDC_ERR_CLIENT_REVOKED	Clients credentials have been revoked	
0x13	KDC_ERR_SERVICE_REVOKED	Credentials for server have been revoked	
0x14	KDC_ERR_TGT_REVOKED	TGT has been revoked	
0x15	KDC_ERR_CLIENT_NOTYET	Client not yet valid; try again later	
0x16	KDC_ERR_SERVICE_NOTYET	Server not yet valid; try again later	
0x17	KDC_ERR_KEY_EXPIRED	Password has expired—change password to reset	The user's password has expired.
0x18	KDC_ERR_PREAUTH_FAILED	Pre-authentication information was invalid	The wrong password was provided.
0x19	KDC_ERR_PREAUTH_REQUIRED	Additional pre-authentication required	
0x1a	KDC_ERR_SERVER_NOMATCH	Requested server and ticket don't match	
0x1b	KDC_ERR_MUST_USE_USER2USER	Server principal valid for user2user only	

0x1c	KDC_ERR_PATH_NOT_ACCEPTED	KDC Policy rejects transited path
0x1d	KDC_ERR_SVC_UNAVAILABLE	A service is not available
0x1f	KRB_AP_ERR_BAD_INTEGRITY	Integrity check on decrypted field failed
0x20	KRB_AP_ERR_TKT_EXPIRED	Ticket expired
0x21	KRB_AP_ERR_TKT_NYV	Ticket not yet valid
0x22	KRB_AP_ERR_REPEAT	Request is a replay
0x23	KRB_AP_ERR_NOT_US	The ticket isn't for us
0x24	KRB_AP_ERR_BADMATCH	Ticket and authenticator don't match
0x25	KRB_AP_ERR_SKEW	Clock skew too great
0x26	KRB_AP_ERR_BADADDR	Incorrect net address
0x27	KRB_AP_ERR_BADVERSION	Protocol version mismatch
0x28	KRB_AP_ERR_MSG_TYPE	Invalid msg type
0x29	KRB_AP_ERR_MODIFIED	Message stream modified
0x2a	KRB_AP_ERR_BADORDER	Message out of order
0x2c	KRB_AP_ERR_BADKEYVER	Specified version of key is not available
0x2d	KRB_AP_ERR_NOKEY	Service key not available
0x2e	KRB_AP_ERR_MUT_FAIL	Mutual authentication failed
0x2f	KRB_AP_ERR_BADDIRECTION	Incorrect message direction
0x30	KRB_AP_ERR_METHOD	Alternative authentication method required
0x31	KRB_AP_ERR_BADSEQ	Incorrect sequence number in message
0x32	KRB_AP_ERR_INAPP_CKSUM	Inappropriate type of checksum in message
0x33	KRB_AP_PATH_NOT_ACCEPTED	Policy rejects transited path

0x34	KRB_ERR_RESPONSE_TOO_BIG	Response too big for UDP; retry with TCP
0x3c	KRB_ERR_GENERIC	Generic error (description in e-text)
0x3d	KRB_ERR_FIELD_TOOLONG	Field is too long for this implementation
0x3e	KDC_ERROR_CLIENT_NOT_TRUSTED	Reserved for PKINIT
0x3f	KDC_ERROR_KDC_NOT_TRUSTED	Reserved for PKINIT
0x40	KDC_ERROR_INVALID_SIG	Reserved for PKINIT
0x41	KDC_ERR_KEY_TOO_WEAK	Reserved for PKINIT
0x42	KDC_ERR_CERTIFICATE_MISMATCH	Reserved for PKINIT
0x43	KRB_AP_ERR_NO_TGT	No TGT available to validate USER-TO-USER
0x44	KDC_ERR_WRONG_REALM	Reserved for future use
0x45	KRB_AP_ERR_USER_TO_USER_REQUIRED	Ticket must be for USER-TO-USER
0x46	KDC_ERR_CANT_VERIFY_CERTIFICATE	Reserved for PKINIT
0x47	KDC_ERR_INVALID_CERTIFICATE	Reserved for PKINIT
0x48	KDC_ERR_REVOKED_CERTIFICATE	Reserved for PKINIT
0x49	KDC_ERR_REVOCATION_STATUS_UNKNOWN	Reserved for PKINIT
0x4a	KDC_ERR_REVOCATION_STATUS_UNAVAILABLE	Reserved for PKINIT
0x4b	KDC_ERR_CLIENT_NAME_MISMATCH	Reserved for PKINIT
0x4c	KDC_ERR_KDC_NAME_MISMATCH	Reserved for PKINIT

- **Pre-Authentication Type** [Type = UnicodeString]: the code of pre-Authentication type that was used in TGT request.

Table 5. Kerberos Pre-Authentication types.

Expand table

Type	Type Name	Description
0	-	Logon without Pre-Authentication.
2	PA-ENC-TIMESTAMP	This type is normal for standard password authentication.

11	PA-ETYPE-INFO	The ETYPE-INFO pre-authentication type is sent by the KDC in a KRB-ERROR indicating a requirement for additional pre-authentication. It is usually used to notify a client of which key to use for the encryption of an encrypted timestamp for the purposes of sending a PA-ENC-TIMESTAMP pre-authentication value. Never saw this Pre-Authentication Type in Microsoft Active Directory environment.
15	PA-PK-AS-REP_OLD	Used for Smart Card logon authentication.
16	PA-PK-AS-REQ	Request sent to KDC in Smart Card authentication scenarios.
17	PA-PK-AS-REP	This type should also be used for Smart Card authentication, but in certain Active Directory environments, it is never seen.
19	PA-ETYPE-INFO2	The ETYPE-INFO2 pre-authentication type is sent by the KDC in a KRB-ERROR indicating a requirement for additional pre-authentication. It is usually used to notify a client of which key to use for the encryption of an encrypted timestamp for the purposes of sending a PA-ENC-TIMESTAMP pre-authentication value. Never saw this Pre-Authentication Type in Microsoft Active Directory environment.
20	PA-SVR-REFERRAL-INFO	Used in KDC Referrals tickets.
138	PA-ENCRYPTED-CHALLENGE	Logon using Kerberos Armoring (FAST). Supported starting from Windows Server 2012 domain controllers and Windows 8 clients.
-		This type shows in Audit Failure events.

Certificate Information:

- **Certificate Issuer Name** [Type = UnicodeString]**:** the name of Certification Authority that issued smart card certificate. Populated in **Issued by** field in certificate. Always empty for 4771 events.
- **Certificate Serial Number** [Type = UnicodeString]**:** smart card certificate's serial number. Can be found in **Serial number** field in the certificate. Always empty for 4771 events.
- **Certificate Thumbprint** [Type = UnicodeString]**:** smart card certificate's thumbprint. Can be found in **Thumbprint** field in the certificate. Always empty for 4771 events.

Security Monitoring Recommendations

For 4771(F): Kerberos pre-authentication failed.

Expand table

Type of monitoring required	Recommendation
High-value accounts: You might have high-value domain or local accounts for which you need to monitor each action. Examples of high-value accounts are database administrators, built-in local administrator account, domain administrators, service accounts, domain controller accounts and so on.	Monitor this event with the **"Security ID"** that corresponds to the high-value account or accounts.
Anomalies or malicious actions: You might have specific requirements for detecting anomalies or monitoring potential malicious actions. For example, you might need to monitor for use of an account outside of working hours.	When you monitor for anomalies or malicious actions, use the **"Security ID"** (with other information) to monitor how or when a particular account is being used.
Non-active accounts: You might have non-active, disabled, or guest accounts, or other accounts that	Monitor this event with the **"Security ID"** that corresponds to the accounts that should

should never be used.	never be used.
Account allow list: You might have a specific allow list of accounts that are the only ones allowed to perform actions corresponding to particular events.	If this event corresponds to a "allow list-only" action, review the "**Security ID**" for accounts that are outside the allow list.
Account naming conventions: Your organization might have specific naming conventions for account names.	Monitor "**Subject\Account Name**" for names that don't comply with naming conventions.

- You can track all 4771 events where the **Client Address** is not from your internal IP range or not from private IP ranges.
- If you know that **Account Name** should be used only from known list of IP addresses, track all **Client Address** values for this **Account Name** in 4771 events. If **Client Address** is not from the allow list, generate the alert.
- All **Client Address** = ::1 means local authentication. If you know the list of accounts that should log on to the domain controllers, then you need to monitor for all possible violations, where **Client Address** = ::1 and **Account Name** is not allowed to log on to any domain controller.
- All 4771 events with **Client Port** field value > 0 and < 1024 should be examined, because a well-known port was used for outbound connection.
- Also monitor the fields shown in the following table, to discover the issues listed:

Expand table

Field	Issue to discover
Pre-Authentication Type	Value is **not 15** when account must use a smart card for authentication. For more information, see Table 5. Kerberos Pre-Authentication types.
Pre-Authentication Type	Value is **not 2** when only standard password authentication is in use in the organization. For more information, see Table 5. Kerberos Pre-Authentication types.
Pre-Authentication Type	Value is **not 138** when Kerberos Armoring is enabled for all Kerberos communications in the organization. For more information, see Table 5. Kerberos Pre-Authentication types.
Failure Code	**0x10** (KDC has no support for PADATA type (pre-authentication data)). This error can help you to more quickly identify smart-card related problems with Kerberos authentication.
Failure Code	**0x18** ((Pre-authentication information was invalid), if you see, for example N events in last N minutes. This issue can indicate a brute-force attack on the account password, especially for highly critical accounts.