eFAR-Digital Verification Control (DVC) Technology

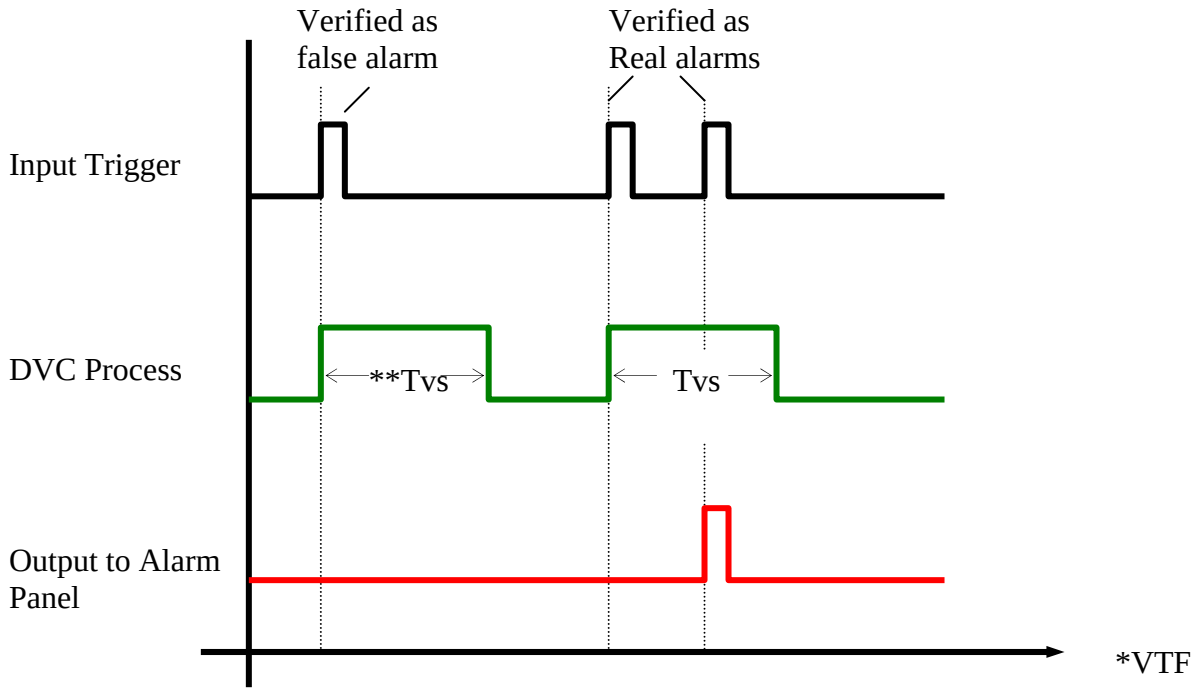
eFAR uses digital single-zone and multiple-zone verification processes to effectively reduce false alarms caused by motion type sensors or other devices without sacrificing protection performance. The processes were developed based on the false alarm patterns and the statistics collected from central stations, and the large test customer account base.

Now over 1000 customer accounts in testing have installed eFARs. Of those 10% are using FAR earliest version, 80% are using middle version, and 10% are using eFAR-the latest version. Each account has an average of 2.5 PIRs (passive infrared detector) installed. Before 1999 when there was no eFAR installed, the total PIR false alarms took 25-35% of the total reports from the central station each day. Between 2000 and 2002 when eFARs were installed, the total PIR false alarm reports were significantly reduced to 2% of the total reports from the central station each day. (If 100% of the customer accounts base (over 4000) have installed eFAR100 version, we expect that the total PIR false alarm rate will reduce to 0.5% of the total reports from the central station each day or less).

Latest DVC is effective in all types of false alarms:

Type of False Alarm	***Percent***	***False Alarm Reduction Rate***
Generated Fortuitously	30%	100%
Generated with Certain Patterns	60%	98%
Bad Environment, e.g. outdoor applications	10%	95%

Basic Single Zone Digital Verification Process



***VTF: Verification Time Frame**
****Tvs: Single Zone Verification Time Frame**

The single zone verification process is developed based on the following statistics from the central station: 95% consecutive false alarms generated by the same PIR are more than 30

seconds apart from each other, typically (60%) from 30 seconds to few hours. In contrast, in most break-in cases (90%), the PIRs are triggered less than five seconds apart from each other.

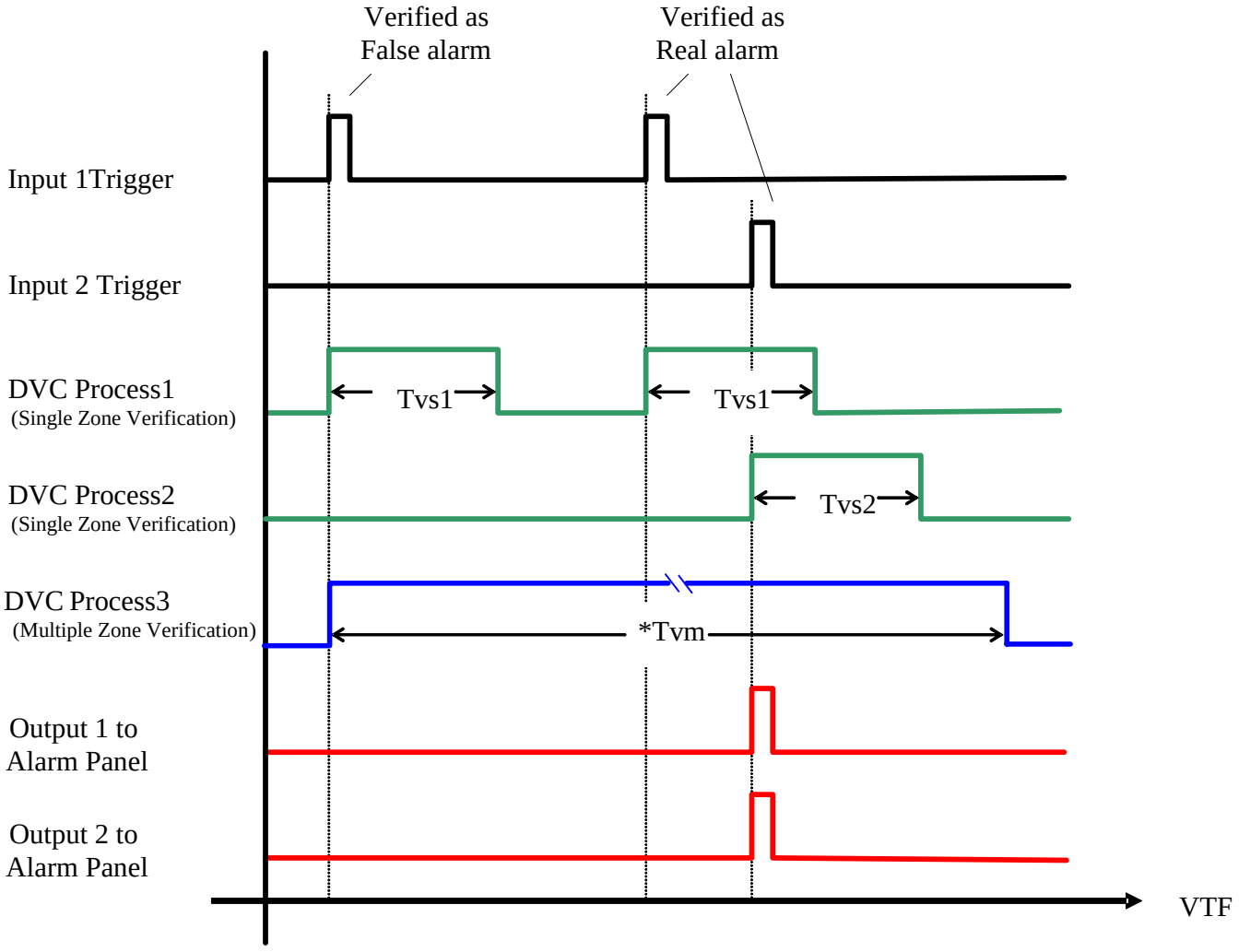
When the eFAR receives the first trigger, it starts the single zone verification process. If there is not another trigger within Single-zone verification time Tvs, eFAR determines that the trigger is a false alarm. In this case eFAR will not output the trigger to the alarm control panel.

If there is a trigger within Tvs, eFAR verifies that it is a real alarm and will output the trigger to the alarm panel.

Basic Multiple-Zone Digital Verification Process

The Multiple-zone verification process is developed based on the following statistics from the central station:

1. Over 95% false alarms occurred during a period of 2 to 8 hours are caused by a single device/PIR. In the worse case, the same device creates multiple false triggers during a short period such as 30 sec to few minutes.
2. Over 90% real break-ins trigger are occur more than one device or sensor (cross zone trigger) within a two to five minute window.



***Tvm: Multiple Zone Verification Time Frame**

When the eFAR receives the first trigger, it starts both the single and the multiple-zone verifications. If there is no more trigger to the other zones within the single and the multiple-zone verification time Tvs and Tvm, eFAR determines that the trigger is a false alarm. In this case eFAR will not output the trigger to the alarm control panel.

If there is a trigger to another zone within Tvm, eFAR verifies the alarm as real and will output the trigger to the alarm panel. So Tvm must be longer than Tvs to support entire system protection performance..

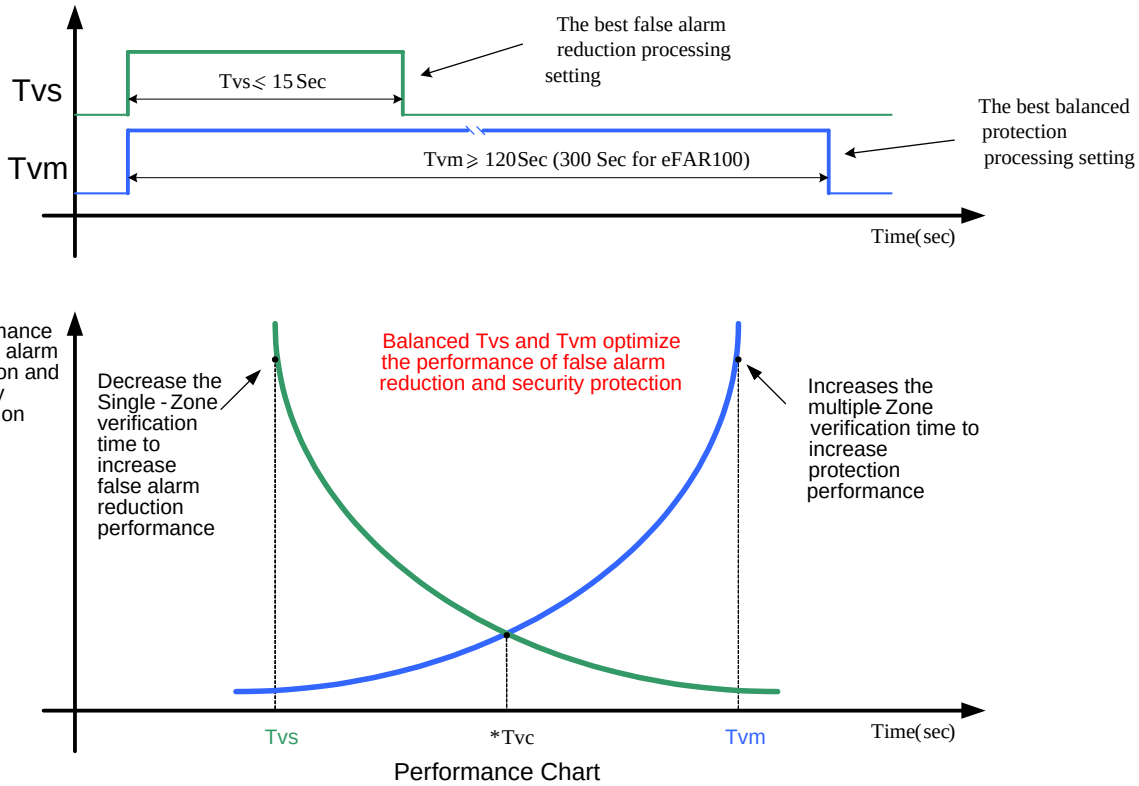
Advantage of DMVSA and DDVCP

eFAR uses the patented Digital Multiple Verification Setting Adjustment (DMVSA) and Digital Dual Verification Control Processes (DDVCP) technology. It uses dual false alarm verification processes to optimize both false alarm reduction performance and security protection performance. The separation and precise determination of the single-zone verification time Tvs and multiple zone verification time Tvm enables the increase of single zone verification false alarm reduction performance and the multiple-zone verification protection performance. The combination of the separated verification processes optimizes the overall false alarm reduction performance and security protection performance.

The graph below shows that eFAR's optimized false alarm reduction performance and the security protection performance are much higher than other comparable products, which uses a verification process with a single and fixed unoptimized verification time Tvc (see performance charts).

Advanced Digital Dual Verification Control Process

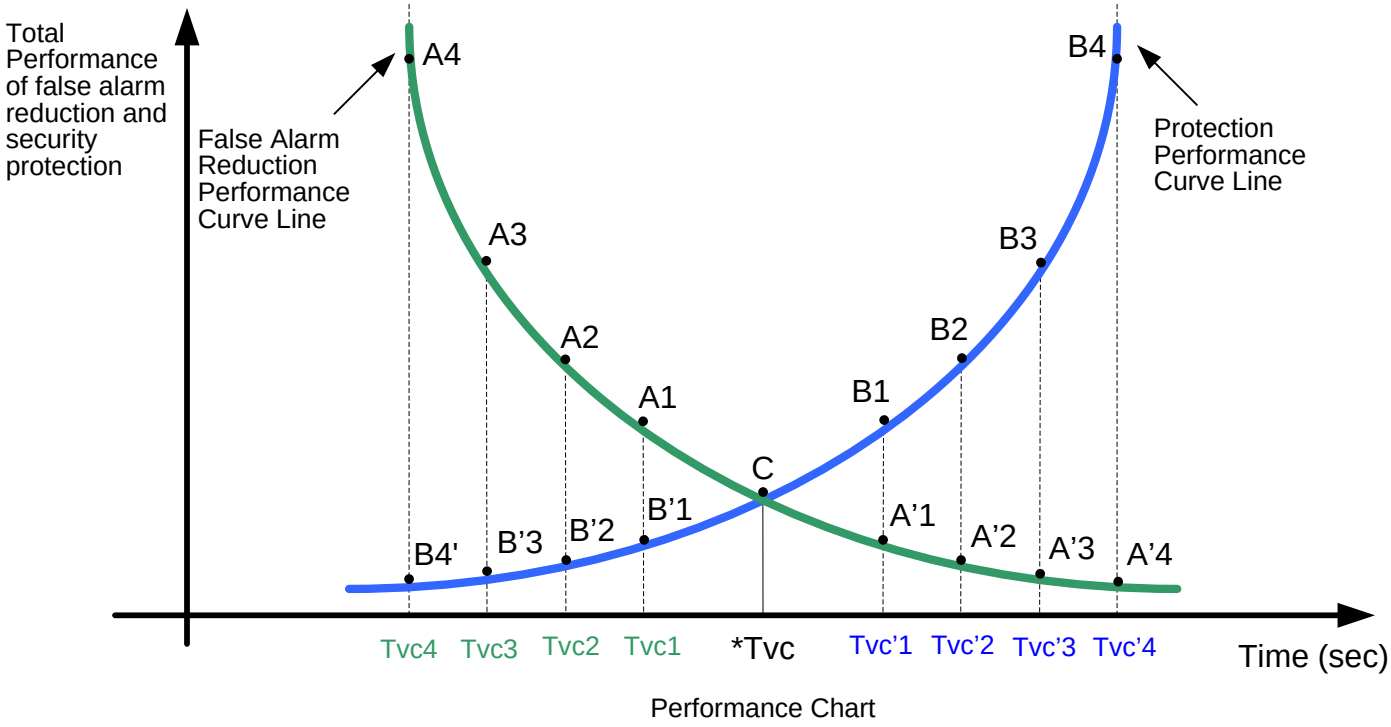
(DDVCP/ DMVSA)



Performance Chart

*** Tvc: Unbalancing or low performance**

Tvc = Tvs = Tvm as single verification time frame setting:



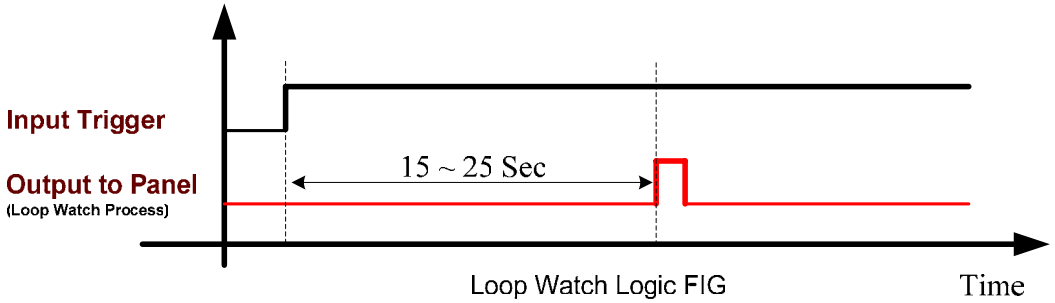
Performance Chart

When Tvc setting for shorter timer period (from Tvc to Tvc4), the false alarm reduction performance can be getting increase until
to A4 (highest point); During the same time, the protection performance will be getting decrease until to B4' (lowest point). Therefore, Tvc setting for longer timer period (from Tvc to Tvc'4), the protection performance can be getting increases until to B4 (highest point) but the false alarm reduction performance will be getting decrease to A'4 (lowest point). Very clear that can not be balance at all (even fix to C point that still remain the both in lower performance level). So far, the industry (such as HONEYWELL / ADEMCO, BOSCH / RADIONICS, GE / CADDX, TYCO / DSC, DMP, NAPCO and PARADOX etc) also including CP01 standard designed and suggested with. The double knock and cross zoning time frame are base on fixed or programmable; also some able to setup from shorter to longer time period that time frame with only single verification time setting method, which is compensative setting confirmation and configuration that it is providing disadvantage performance for entire system. (compares with both performance charts)

Loop Watch Process Method with DVC Process

Fully supervised input the loops which is built-in eFAR module for protectional enhancement functions

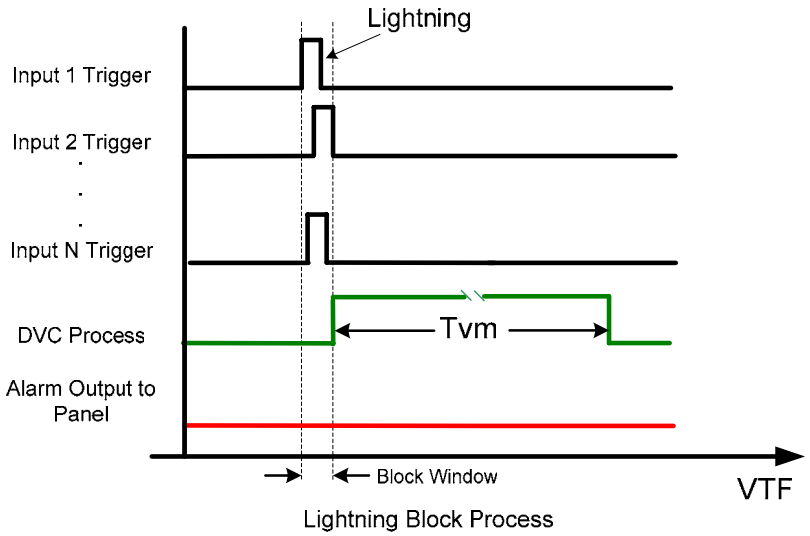
1. Preventing miss detected for any cutting or opening loop and quick damaged devices by intruder.
2. Enhanced the break-in protection performance for single PIR cover the area that may over release contact timing.
3. Balancing the break-in protection performance when eFAR using with door contact, window screen / box / foil and carpet mat, etc. (No motion type devices).



Loop Watch Logic FIG

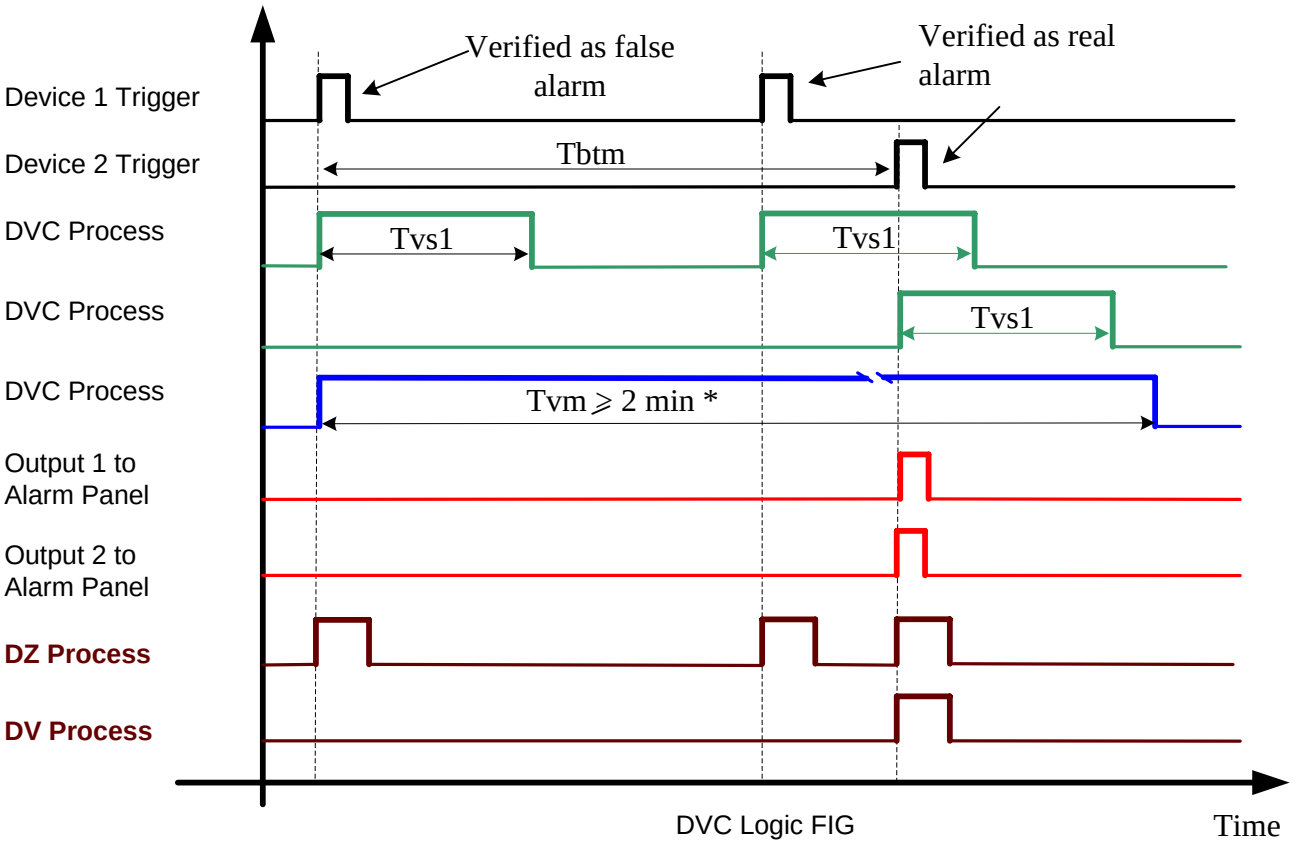
Lightning Block Processing

The lightning block processing basically design a group of simultaneously tripped zones as only a single zone and waits to have it verified by another event. Either strong lightning or RF wave strikes and interferes, more than two devices will go into alarm within the block window time. This is something an intruder unlikely / unable to do. The eFAR analyses for the simultaneously trip of 2 or more zones and then suppresses the alarm (normally a cross zone alarm). It considers the lightning events to be the first half of the DVC logic. If the second half of the DVC logic occurs (i.e. second zone on double knock or second zone on cross zoning) then the alarm will be verified and passed to the alarm control panel.



Lightning Block Process

DZ / DV Process Method with DVC Process



DZ Process Output

The **DZ** (diagnostic zone) process response every trigger no matter on signal zone or multi-zone (See above FIG).

1. DZ is an optional function built-in eFAR. It's recommended to install by not necessary.

2. DZ only suggested to install in the case that extra zone is available in alarm control panel or zone expander. To sacrifice a PIR zone in use for DZ should be avoided.

3. Corresponding to every signal, DZ, integrated with security system, creates local warning signals, such as Audible, Visual or both to enhance the protection, no matter the trigger signal is false alarm or real alarm.

4. A diagnostic zone can be set to log every trigger from the devices. Central station only records the logged history instead of dispatching signal.

5. In a period of time such as 6 months, 12 months or 24 months etc, the history of diagnostic zone could be used for false alarm statistics:

$$\text{eFAR False Alarm Prevention Ratio} = \left(1 - \frac{\text{The number of reduced false alarm trigger}}{\text{The number of DZ trigged history}}\right) \times 100\%$$

(eFAR Performance Ratio)

(According to real cases, the ratio normally reaches 88% ~ 98%)

Example:
In 12 months, a commercial alarm system had 62 false alarms occurred (DZ Logged), in which only 3 (PIR #4) are received by central station. So:

$$\text{eFAR False Alarm Prevention Ratio} = \left(1 - \frac{3}{62}\right) \times 100\% = 95.16\%$$

(After the on-field analysis, PIR #4 was found the main reason. PIR #4 was used for at least 6 years. Dirty environment and some inspects made it worse. Since PIR #4 was cleaned and adjusted, no more false alarm occurred. Case data are available by request.)

DV Process Output

The **DV** (digital verification) process response any multiple cross zone trigger (See above FIG).

1. DV is an optional function built-in eFAR. It's recommended to install by not necessary.

2. DV only suggested to install in the case that central station or local police enforcement require additional alarm signal verification to response.

3. During Tvm (120Sec), DV sends a DV signal to central station if more than 2 cross zones are triggered. Central station dispatch the police according the verified alarm signal.

4. The DV function brings 95% Plus verified real break-in ratio. In the areas, where verified dispatch regulation is enforced, DV can provide a even better "Police Code" for true digital responded methods.